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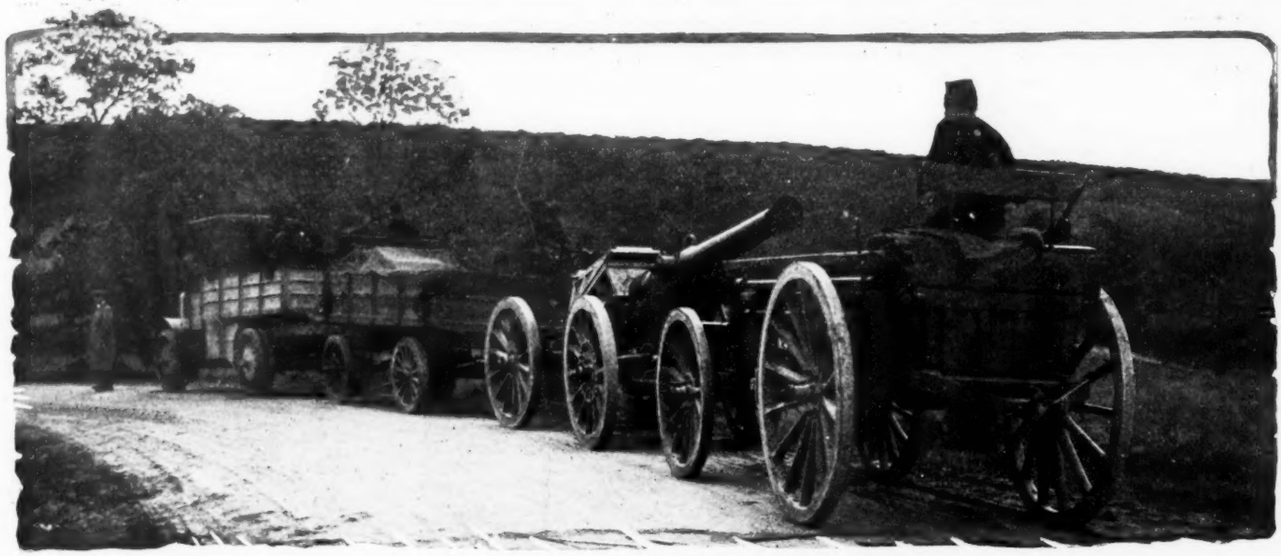
The AUTOMOBILE



One of the seven four-wheel drive tractors in the French army maneuvers. Each train consisted of the tractor, ammunition wagon, 6-inch cannon, and another ammunition wagon

Motorizing Mars in France

Motor Trucks Demonstrate Their Superiority to Horses Under Conditions of War in French Army Tests Covering Rough Roads and Hilly Country

PARIS, FRANCE, Oct. 1.—In the future European war the horse will play a much smaller rôle than formerly. In his place will be the motor tractor and other forms of motor vehicles. The recent French army maneuvers demonstrated that the motor tractor can draw the big 6-inch heavy artillery guns over any road on which it has been possible to move these guns by horses. Further, these tractors are able to travel anywhere that horses can travel. It has been still further demonstrated that one four-wheel drive tractor can handle these 6-inch or 155-millimeter guns with as great ease as it is ordinarily accomplished by twenty-five or thirty horses. With the new tractors the guns are moved over the roads at a speed of 8 miles per hour and over the fields at 5 miles per hour.

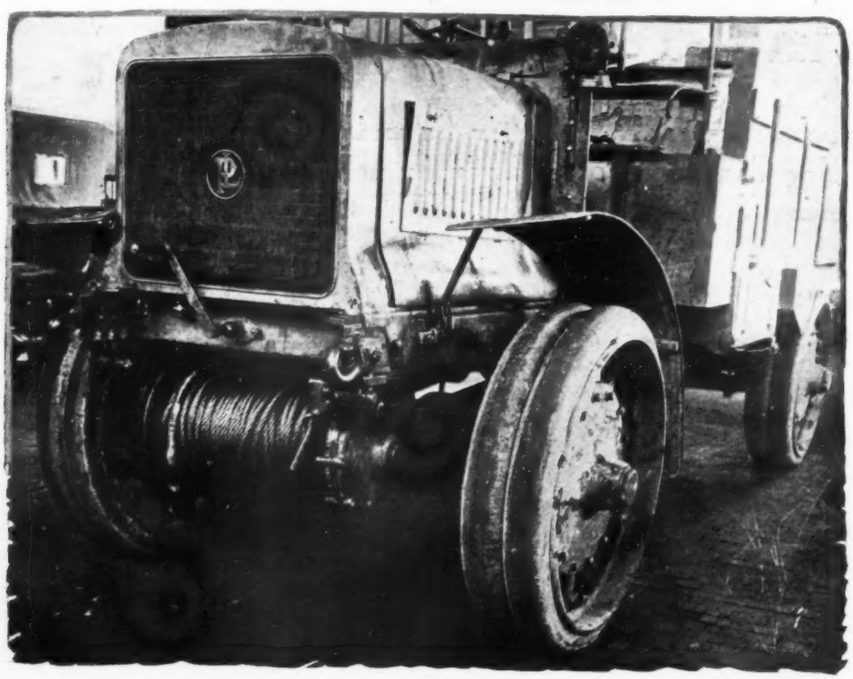
These recent maneuvers have proven how practical is the motor vehicle in the zone of actual warfare. The maneuvers were held in hilly country threaded with narrow roadways, often with so rocky a surface that the fields were taken in preference to the highway.

The motor vehicles in use were not confined solely to the transportation of heavier artillery, but they superseded the horse in the wireless telegraph department. The commissary transported its fresh meat supplies from the abattoirs to within the line of the army proper. Groups of motor trucks accompanied the fleet of aeroplanes and transported them along the highways. Army repair departments were built into motor vans that were moved to wherever the work had to be done. Transformed Paris motor buses were used as officers' headquarters and for the general staff. Motor ambulance service was used exclusively and, in fact, it was a motorized army from advance guard to rear guard.

Perhaps of the greatest interest was the four-wheel drive gasoline tractors used in the heavy artillery work. These tractors, produced by Panhard in conjunction with Chatillon, had already been tested on the various artillery grounds but never previously used over ordinary country roads and the performances shown by them have satisfactorily demonstrated their suitability for a permanent place in the army equipment.

The Panhard tractor hauling the heavy siege guns over ordinary country roads through hilly territory at 8 miles per hour

General view of four-wheel drive army tractor carrying ten to twelve men and drawing two ammunition wagons in addition to the 6-inch cannon



Front view of the Panhard four-wheel drive tractor showing steel cable on drum for use in assisting itself out of road difficulties

There were seven tractors, one of them being held in reserve, taking part in the maneuvers. Each train consisted of the tractor, an ammunition wagon, the 155-millimeter cannon, and an ammunition wagon. From ten to twelve men were carried on the tractor, and on each of the ammunition wagons there was a brakesman. The Panhard tractor has a four-cylinder motor under a bonnet with separate cylinders of 4.8 by 5.9 inches. There is a single differential for the four wheels, contained within the gearbox, and provided with a differential lock. The drive is by means of propeller shafts without universal joints, each shaft being rigid and all the gearing inclosed. The four wheels are not only positively driven but are steerable. Twin rubber tires are mounted on the front and rear wheels, but provision is also made for fixing auxiliary ribbed steel bands for operation in soft ground. A sand box is mounted ahead of the rear wheels with facilities for opening it from the driver's seat. Placed across the front of the motor is a winding drum with 300 feet of steel cable, the drum being driven from the motor and allowing vehicles to be hauled or the tractor to haul itself out of difficult ground at the rate of about 1.25 miles an hour. The weight of the tractor is about 2.5 tons and its useful load during the maneuvers was 6 to 7 tons. The total weight of the train was between 15 and 16 tons.

Wireless Stations Carried

With each army corps were several wireless telegraphy installations mounted on automobiles. A central post was established at Toulouse and another at Agen, and auxiliary posts at various points. These auxiliary stations were able to transmit messages distances of 150 to 180 miles, and the main stations kept in constant communication with the Eiffel Tower at Paris, a distance of 500 miles.

These vehicles were supplied by Berliet and by Delahaye. Each installation consisted of two automobiles, the motor of the first driving the dynamo and generating current which was transmitted to the second vehicle equipped with the wireless telegraphy plant. Each vehicle has an inclosed van body, with rear entrance, and the poles for the receivers are attached to the sides of the van body. In each case the motor is a four-cylinder model of only 3 by 5.1 inches bore and stroke.

Buses Transport Meat

Fresh meat was brought to the troops by means of transformed Paris motorbuses. The army has an agreement with the Paris motorbus company whereby a large number of its vehicles can be taken over for military use in case of mobilization, and it is in con-

nection with this agreement that motorbuses take part in the maneuvers. These vehicles are single-deck Schneiders and De Dion Boutons, with a 35 horsepower motor under the driver's feet. For army work the glass windows are replaced by wire gauze screens and a wire gauze sliding door is fitted. Meat racks are placed down the full length of each vehicle and the seats are removed. A load of 2.5 tons is carried.

Time Economy in Distributing

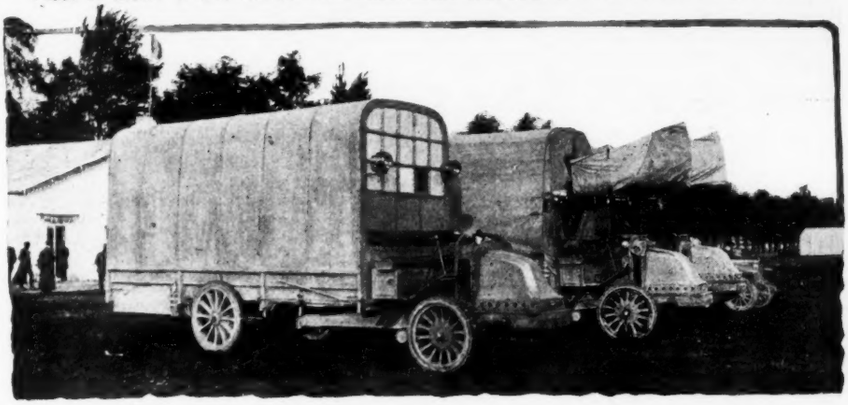
During the maneuvers cattle were parked behind the line of troops about 30 to 40 miles behind the actual fighting line, and each morning the meat wagons were loaded and sent out to the troops. It was found advisable, in most cases, to unload the meat at a determined point amid the body of the troops and have the final distribution take place on the regimental horse-drawn wagons. By this means the driver of the automobile was not obliged to make journeys over narrow lanes and across country in search of scattered and hidden groups of men. This distribution of meat by automobiles made it possible to maintain the abattoirs in a suitable position near a railway station from which the cattle were unloaded. With an elastic distributing agent it was not necessary to make the cattle follow every movement of the troops, as is done under the older method of distribution by train and horse vehicles. The animals are not only kept in better condition, but the men receive fresh meat every day, a condition which is very difficult of attainment in feeding an army.

Use was also made of motorbuses as offices for the general staff. These were the ordinary vehicles as used in Paris, slightly transformed for carrying the clerical staff, their books and accounts. As all the staff officers made use of automobiles, and the *état-major* made very frequent and rapid changes of position, it was necessary that the clerical staff should have adequate means of following.

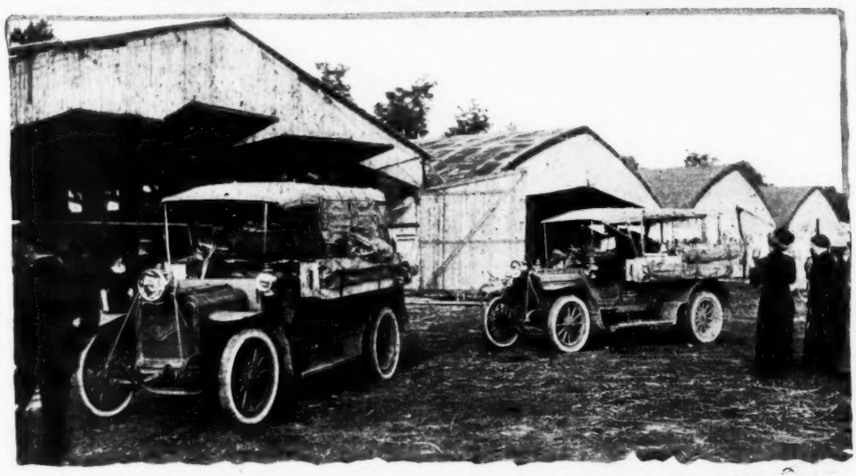
Trucks Carried All Supplies

Practically all supplies were brought to the troops by means of automobile trucks. These were either army trucks or army subsidy types belonging to private firms and requisitioned for the period of the maneuvers. In this latter case the drivers were reservists who habitually drive these trucks, or they were reservist mechanics supplied from the automobile factory. The owners are accorded an indemnity for the use of the vehicles, fuel and oil being provided by the army, while the drivers receive the ordinary army pay. The trucks worked in sections of nine, although in actual warfare the sections number eighteen vehicles. Their work consisted

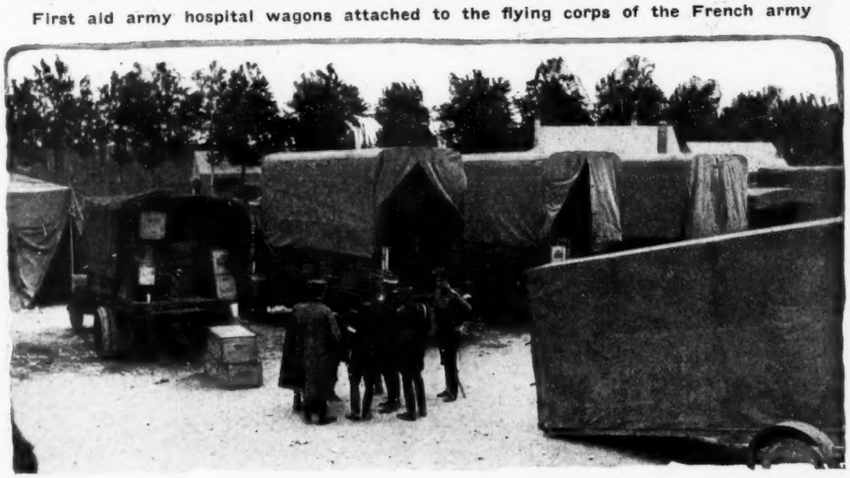
Fleet of motor trucks loaded with dismounted monoplanes used in the army service



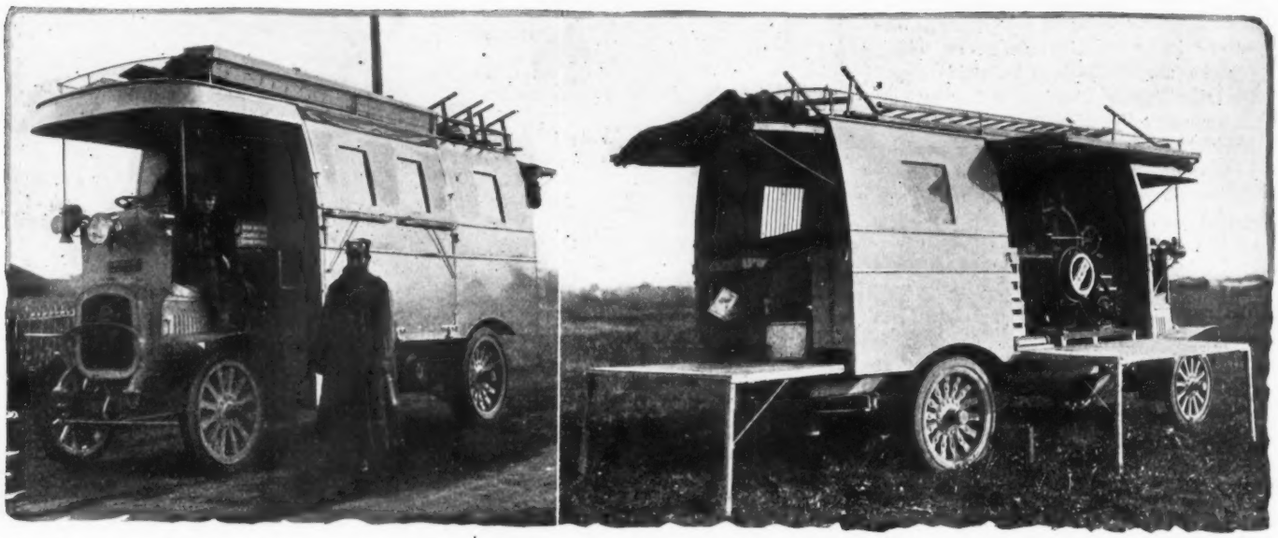
How aeroplanes are transported by road in the modern French army



First aid army hospital wagons attached to the flying corps of the French army



Fleet of motor trucks forming a part of the aviation department in the army tests



Delahaye motor truck equipped as a traveling automobile workshop. The sides fold down and up, thereby giving additional floorspace

Typical scene of one of the army repair shops which were used for all repairs

The changed appearance of an army encampment showing the motor traveling repair shop

in carrying ammunition and stores from a central depot to the troops over distances as great as 40 miles.

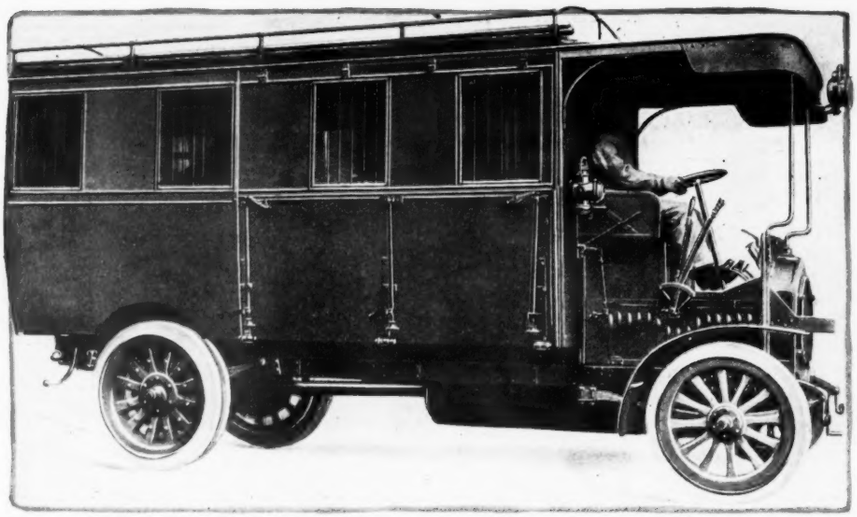
Practically every make of vehicle was employed, but in each case they were the approved army subsidy types having been tested in the annual trials. Experiments were made with a 24-hour service for a certain number of these vehicles, naturally with different shifts of drivers. In some cases also, the army trucks were fitted to carry stretchers, so that on returning from the fighting line to the base they could carry off some of the wounded.

Special Ambulance Service

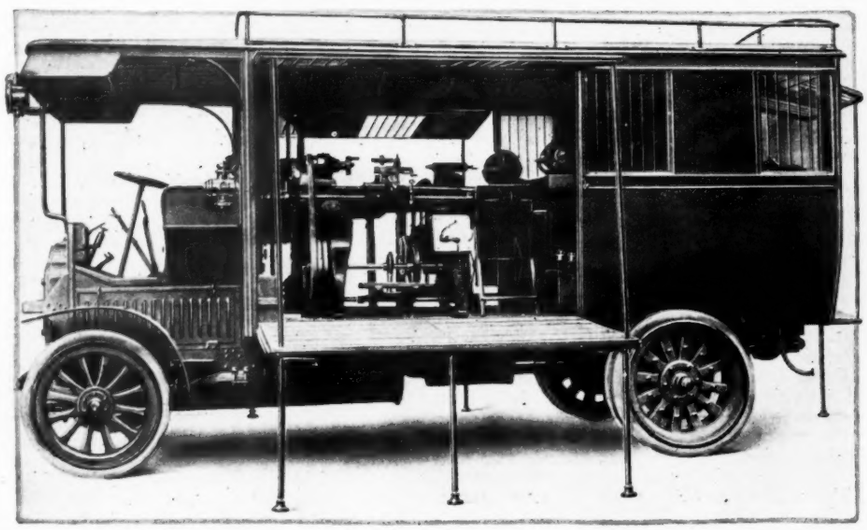
A special ambulance service was instituted with the use of ordinary touring cars transformable into ambulances under Dr. Lemaistre's system. This consisted of a special metallic frame capable of being attached to any touring car and receiving a number of stretchers. Fitted up in this way each car could carry six wounded men. A special medical car established by the Schneider company, under the direction of Dr. Boulant was also in service. This is a closed vehicle having an operating room, all necessary surgical instruments, sterilizers, electric lighting and heating, etc., and was kept in readiness for removal to the position where its services were most required. One of these vehicles was in use in the Balkan war.

Trucks Care for Aeroplanes

In connection with the aerial corps, a wide use was made of motor vehicles. Although practically all the aeroplanes responded to the mobilization call under their own power, flying in some cases 700 miles across France, each flying machine was followed by a motor vehicle capable of carrying it when dismounted. These vehicles naturally vary with the type of machine they have to carry, but are generally big-capacity canvas-cov-



Motor trucks used to convey dismounted monoplanes in the recent French army maneuvers



The DeDion-Bouton repair shop, showing machinery equipment inside, folding doors, etc.

ered vans. The fast single seater monoplanes, used for controlling artillery fire, were in many cases carried on two-wheel trucks with a canvas roof. These trucks were trailed by moderately fast motor vehicles fitted up with such necessary spares as propellers, landing chassis, wheels, and motor parts. They were thus used to give first aid to the aeroplanes in case of accident and to tow them when they had to follow the regiment. Several of these sections camped out during the whole of the maneuvers. All the canvas covering of the vehicles is of a dullish green color so as to make it difficult for an enemy to discover their whereabouts when searching aloft.

Complete Repair Departments

Very complete automobile repair departments were attached to the flying corps. The army has placed in service a number of motor trucks with van bodies having hinged sides capable of being opened down so as to form an extended floor. Each vehicle has electric motor and electric lighting plant, a lathe, circular saw, forge, and complete equipment of tools. A big supply of engine spares being attached to each flying corps, the traveling workshop is capable of putting into service any damaged aeroplane really worth repairing.

The problem of supplying fuel for the immense number of automobiles and aeroplanes which would be used in any modern war is a most serious one. It is understood that the French army has taken this into consideration and has contracts whereby several hundred thousand gallons of gasoline are constantly kept in reserve for army purposes only by the refiners.

Two of the motor trucks used in the wireless telegraph department of the French army tests. These machines go in pairs, the forward one carrying the motor and electric generator and motor, and the rear one the wireless apparatus

Show Exhibitors At New York and Chicago

Passenger Car Companies That Will Exhibit at National Shows

Floor Plans Showing Car Exhibit Spaces—Accessory Spaces Not Yet Assigned

NEW YORK CITY, Oct. 2—Final allotments of space for the automobile shows to be held in this city at the Grand Central Palace, January 3-10, and in Chicago at the Coliseum and the Armory, January 24-31, under the auspices of the Automobile Chamber of Commerce, were made today at a meeting of the organization.

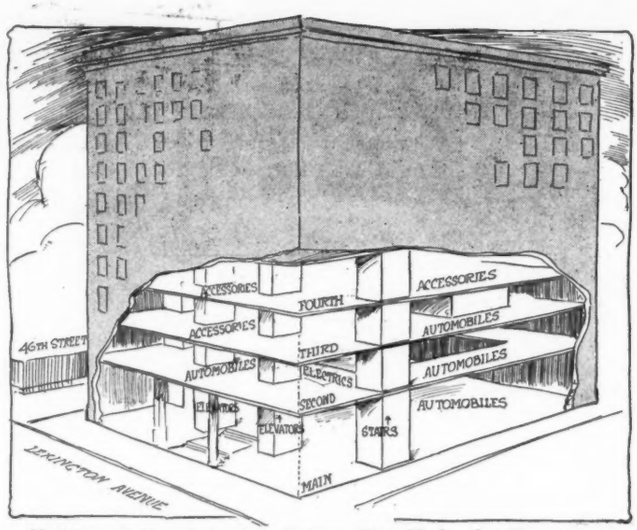
There were ninety-six applicants for automobile space at the New York show and 106 for the Chicago show, the largest number ever applying, due to the electric vehicle applicants. Sixty-five applicants for the New York show are members of the Automobile Chamber of Commerce and seventy-one are members at the Chicago show.

The applications were larger by the accessory manufacturers this year than before. The accessory people are asking for more space, but it has been found that encroachments will have to be made on the accessory territory by the automobile firms, due to the exceptionally large list of applications.

A number of the tire, axle and ball bearing people, who in the past have held large exhibits at the shows, have decided that exhibitions of this character no longer pay, and they have with one accord, given up the idea of exhibiting this year in either the New York or Chicago shows. The Motor and Accessory Association has in the past, not only been given the choice spaces after the car makers, but has also shared in the profits from the show. This year, while they were to get preferred space, there was to be no rebate to its members.

Among the tire concerns which will not exhibit are the Republic, Kelly-Springfield; Fisk; Goodrich; Ajax-Grieb; Swinehart; Firestone; Goodyear; Diamond; Michelin, Federal and United States. Concerns which stated they will exhibit are: the Pennsylvania and Empire. It has been impossible to get any information as to the show plans of the other tire makers.

Many of the axle and ball bearing people have given up the idea of exhibiting this year. Those concerns, which manufacture ball bearings, roller bearings, etc., are as follows: Norma, Timken Roller Bearing; Hess-Bright; Bower; the American Ball Bearing; Hyatt; Standard Roller Bearing and J. S. Bretz. The



Skeleton of Grand Central Palace, New York, showing arrangements of automobile and accessory exhibits on the first four floors of the building

S. K. F. and R. I. V. people are unable to give any authoritative information as to their show plans. Marburg Bros., Inc., is the only concern, thus far, which has stated that it will exhibit.

Several of the axle manufacturers have stated that they will not exhibit this year, such as American Ball Bearing, Standard Roller Bearing and Shelden Axle. No information as to the plans of the remaining concerns has as yet been received.

At the Chicago show, those makers who were forced to take basement allotments found that their spaces were inadequate, especially the Norwalk and the Keeton companies whose cars have exceptionally large wheelbases.

Other topics of interest arose and were discussed at the meeting. One proposal was to change the name of the Chamber to the National Automobile Chamber of Commerce, so that the national character of the organization would be suggested in the title.

The question arose as to whether a special exhibition building should be built at the Panama Exposition for automobiles. The Chamber some time ago, by resolution, turned down an offer of the San Francisco promoters for the erection of just such a building, and left it to the members to take their chances in getting what spaces they wanted in the Transportation Building, where 65,000 square feet is available for exhibition purposes. Hugh Chalmers, who was formerly against the special building idea, showed that he had changed his mind concerning it.

Exhibitors of Cars for New York and Chicago Shows

New York Show

MAIN FLOOR

Company	Address
Abbott Motor Co	Detroit, Mich.
Apperson Bros. Automobile Co	Kokomo, Ind.
Buick Motor Co	Flint, Mich.
Cadillac Motor Car Co	Detroit, Mich.
Chalmers Motor Co	Detroit, Mich.
Cole Motor Car Co	Indianapolis, Ind.
Franklin Mfg. Co., H. H	Syracuse, N. Y.
Hudson Motor Car Co	Detroit, Mich.
Hupp Motor Car Co	Detroit, Mich.
Jackson Automobile Co	Jackson, Mich.
Thos. B. Jeffery Co	Kenosha, Wis
Kissel Motor Car Co	Hartford, Wis.
Krit Motor Car Co	Detroit, Mich.
Locomobile Co	Bridgeport, Conn.
Lozier Motor Co	Detroit, Mich.
Maxwell Motor Co	Detroit, Mich.
Mitchell-Lewis Motor Co	Racine, Wis.
Oakland Motor Car Co	Pontiac, Mich.
Packard Motor Car Co	Detroit, Mich.
Paige-Detroit Motor Car Co	Detroit, Mich.
Peerless Motor Car Co	Cleveland, O.
Pierce-Arrow Motor Car Co	Buffalo, N. Y.
Pope Mfg. Co	Hartford, Conn.
Premier Motor Mfg. Co	Indianapolis, Ind.
Regal Motor Car Co	Detroit, Mich.
Reo Motor Car Co	Lansing, Mich.
Stearns Co., F. B	Cleveland, O.
Studebaker Corp	Detroit, Mich.
Velie Motor Vehicle Co	Moline, Ill.
White Co	Cleveland, O.
Willys-Overland Co	Toledo, O.
Winton Motor Car Co	Cleveland, O.

SECOND FLOOR

Company	Address
American Motors Co	Indianapolis, Ind.
Auburn Automobile Co	Auburn, Ind.
Austin Automobile Co	Grand Rapids, Mich.
Cartercar Co	Pontiac, Mich.
Case T. M. Co., J. I	Racine, Wis.
Fiat Automobile Co	Poughkeepsie, N. Y.
Garford Co	Elyria, O.
Gt. Western Automobile Co	Peru, Ind.
Haynes Automobile Co	Kokomo, Ind.
Henderson Motor Car Co	Indianapolis, Ind.
Herreshoff Motor Co	Detroit, Mich.
Imperial Automobile Co	Jackson, Mich.
Kline Motor Car Corp	York, Pa.
McFarlan Motor Car Co	Connersville, Ind.
Marion Motor Car Co	Indianapolis, Ind.
Mercer Automobile Co	Trenton, N. J.
Moline Automobile Co	Moline, Ill.
Moon Motor Car Co	St. Louis, Mo.
Motor Car Mfg. Co	Indianapolis, Ind.
National Motor Vehicle Co	Indianapolis, Ind.
Nordyke & Marmon Co	Indianapolis, Ind.
Olds Motor Works	Lansing, Mich.
Pullman Motor Car Co	York, Pa.
Speedwell Motor Car Co	Dayton, O.
Stevens-Duryea Co	Chicopee Falls, Mass.
Stutz Motor Car Co	Indianapolis, Ind.
Westcott Motor Car Co	Richmond, Ind.

THIRD FLOOR

Company	Address
Aristos Co	New York City
Chandler Motor Car Co	Cleveland, O.
Cornelian Motor Co	Kalamazoo, Mich.
Davis Carriage Co	Richmond, Ind.
Havers Motor Car Co	Port Huron, Mich.
Keeton Motor Car Co	Detroit, Mich.
King Motor Car Co	Detroit, Mich.
Lomax Motor Car Co	Lomax, Ill.
Lyons-Atlas Co	Indianapolis, Ind.
McIntyre Co., W. H	Auburn, Ind.
Metz Co	Waltham, Mass.
Norwalk Motor Car Co	Martinsburg, W. Va.
Palmer-Singer Mfg. Co	Long Island City, N. Y.
Partin Mfg. Co	Chicago, Ill.
Paterson Co., W. A	Flint, Mich.
Simplex Automobile Co	New Brunswick, N. J.
Standard Electric Car Co	Jackson, Mich
Thomas-Howard	Brooklyn, N. Y.
Twombly Car Corp	New York City.
Vaughan Car Co	Kingston, N. Y.

Chicago Show

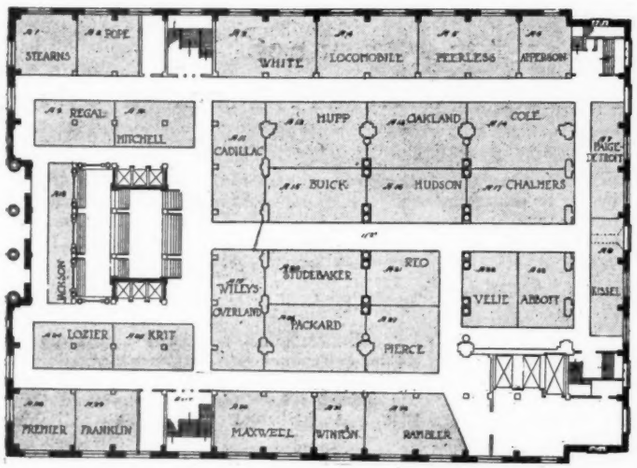
Company	Address
Abbott Motor Co	Detroit, Mich.
American Motors Co	Indianapolis, Ind.
Apperson Bros. Automobile Co	Kokomo, Ind.
Auburn Automobile Co	Auburn, Ind.
Buick Motor Co	Flint, Mich.
Cadillac Motor Car Co	Detroit, Mich.
Cartercar Co	Pontiac, Mich.
Case T. M. Co., J. I	Racine, Wis.
Cole Motor Car Co	Indianapolis, Ind.
Chalmers Motor Co	Detroit, Mich.
Fiat Automobile Co	Poughkeepsie, N. Y.
Franklin Mfg. Co., H. H	Syracuse, N. Y.
Garford Co	Elyria, O.
Haynes Automobile Co	Kokomo, Ind.
Hudson Motor Car Co	Detroit, Mich.
Hupp Motor Car Co	Detroit, Mich.
Imperial Automobile Co	Jackson, Mich.
Jackson Automobile Co	Jackson, Mich.
Thos. B. Jeffery Co	Kenosha, Wis.
Kissel Motor Car Co	Hartford, Wis.
Krit Motor Car Co	Detroit, Mich.
Locomobile Co	Bridgeport, Conn.
Lozier Motor Co	Detroit, Mich.
Marion Motor Car Co	Indianapolis, Ind.
Maxwell Motor Car Co	Detroit, Mich.
Metz Co	Waltham, Mass.
Mitchell-Lewis Motor Co	Racine, Wis.
Moon Motor Car Co	St. Louis, Mo.
National Motor Vehicle Co	Indianapolis, Ind.
Nordyke & Marmon Co	Indianapolis, Ind.
Oakland Motor Co	Pontiac, Mich.
Olds Motor Works	Lansing, Mich.
Packard Motor Car Co	Detroit, Mich.

Paige-Detroit Motor Car Co.	Detroit, Mich.
Peerless Motor Car Co.	Cleveland, O.
Pierce-Arrow Motor Car Co.	Buffalo, N. Y.
Pope Mfg. Co.	Hartford, Conn.
Premier Motor Mfg. Co.	Indianapolis, Ind.
Regal Motor Car Co.	Detroit, Mich.
Reo Motor Car Co.	Lansing, Mich.
Stearns Co., F. B.	Cleveland, O.
Stevens-Duryea Co.	Chicopee Falls, Mass.
Studebaker Corp.	Detroit, Mich.
Velie Motor Vehicle Co.	Moline, Ill.
White Co.	Cleveland, O.
Willys-Overland Co.	Toledo, O.
Winton Motor Car Co.	Cleveland, O.

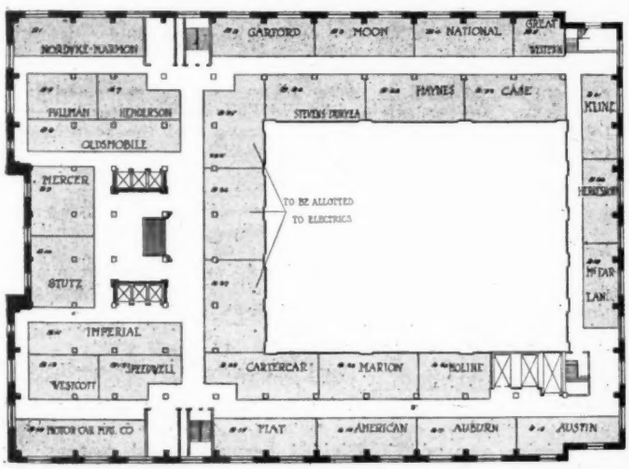
BASEMENT

Company	Address
Century Electric Car Co.	Detroit, Mich.
Chandler Motor Car Co.	Cleveland, O.
Chicago Electric Motor Car Co.	Chicago, Ill.
Cornelian Motor Co.	Kalamazoo, Mich.
Cricket	
Davis Carriage Co.	Richmond, Ind.
Elkhart Carriage & Harness Mfg. Co.	Elkhart, Ind.
Havers Motor Car Co.	Port Huron, Mich.
Keeton Motor Car Co.	Detroit, Mich.
King Motor Car Co.	Detroit, Mich.
Lomax Motor Car Co.	Lomax, Ill.
McIntyre Co., W. H.	Auburn, Ind.
McCord	
Norwalk Motor Car Co.	Martinsburg, W. Va.
Partin Mfg. Co.	Chicago, Ill.
Thomas-Howard	Brooklyn, N. Y.
Vaughn Car Co.	Kingston, N. Y.
Vulcan	

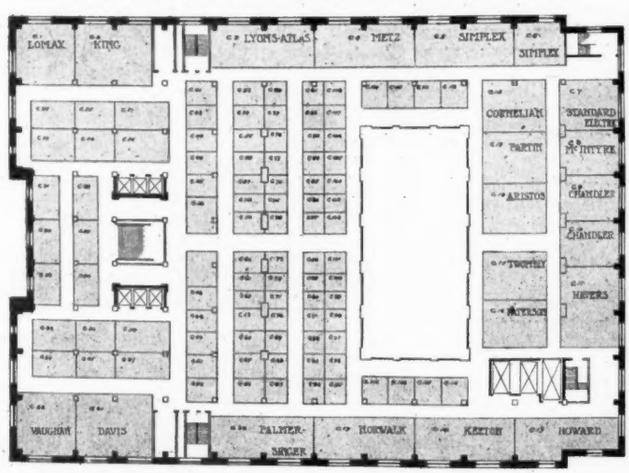
New York Show Diagrams



Main floor, Grand Central Palace, showing exhibitors

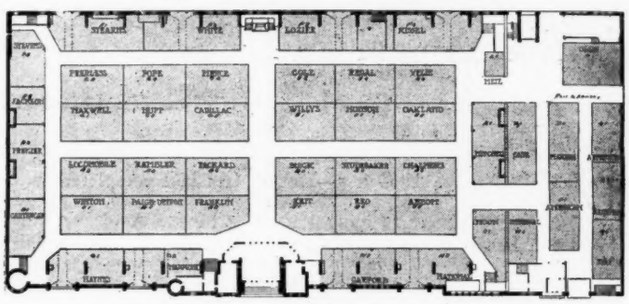


Second floor, Grand Central Palace, showing exhibitors



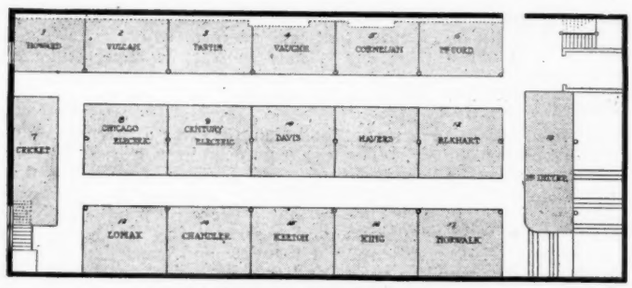
Third floor, Grand Central Palace, showing car and accessory spaces. Diagram of fourth floor not given

Chicago Show Diagrams



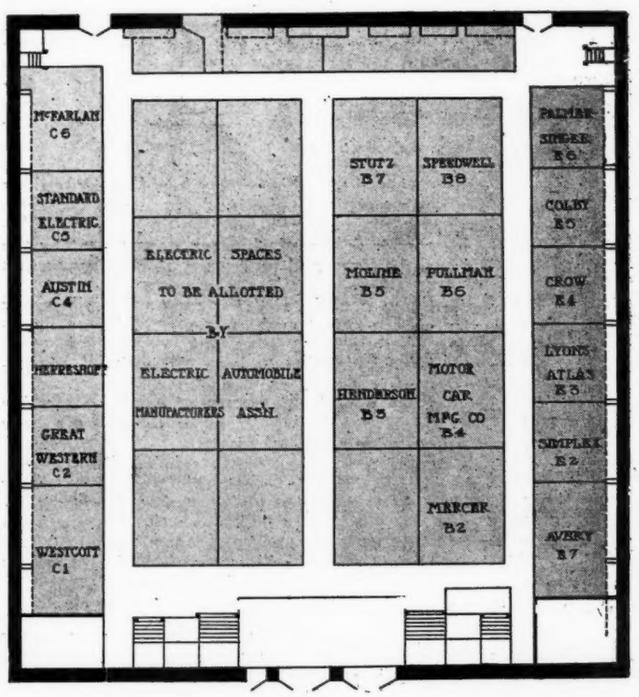
Exhibitors in Coliseum and Annex

This illustration shows the main floor of the Coliseum, together with the Annex, in which the Chicago Automobile Show is to be held



Exhibitors in Annex basement

At the Chicago Show a number of cars are shown in the basement of the Annex. The allotments are shown in the illustration.



Main floor, Armory, showing exhibits with space taken by electrics in the center of the hall

Washington Should Build and Maintain a System of National Highways

Third American Road Congress Asks for Permanent Road Department—President Asked To Draft Road System

DETROIT, MICH., Oct. 5—Detroit has just completed its 6-day lovefeast of good roads, over 7,000 delegates participating in the third annual meeting of the American Road Congress which opened Monday morning. Never before have good roads got more under the skin of motorized Detroit and Michigan. Not content with hotelfuls of delegates from the four corners of the country Michigan, with its celebrated sand roads, got in line and occupied the limelight all day Friday when its roads and lack-of-roads were held before the public gaze.

Seven thousand delegates is a new record for road conventions in America, it really looks as if the time-honored road movement had got into the motor band wagon, that the driver had at last got into direct drive, and that now, if the machine only keeps going, that the road movement will get somewhere. As Thaddeus Terry put it, "the day is here to start working and stop talking."

Success in Capitals

That the Third American Road Congress was a success is putting it conservatively. The congress has been a real success. A success in the spreading of road facts, a success in that many delegates have unburdened their souls with their confession of highways, a success that makers of road machinery have had a good exposition, and a success in that the various road material interests have got together and learned that there is room enough and to spare, and that instead of brick interests fighting cement, or asphalt forces warring with macadam, all should unite against the common enemy, unimproved highways.

The Resolution Feast

As usual the convention has its committee on resolutions, resolutions that are supposed to serve as the self-registering thermometer of the convention. These resolutions are always more impressive before submitted and passed upon. Scarcely a speaker gets well into his subject before he wants to pass some resolution. Then they look big, important affairs, but a few hours after the convention doors have been closed and you read in the evening paper the text of the resolutions, you wonder why so much fuss was made and so little accomplished. But resolutions are necessary, at least road delegates think they are and the resolution committee this year should wear golden crowns for their work goes from the kindergarten to the completion of the post graduate course in road building. The resolution committee literally took the Washington government by the horns and asked it to be good and pull the road building wagon along.

They asked that a national department of public roads be instituted with a secretary having a place in the President's cabinet.

They asked for legislation to have the national government represented at future road meetings.

They asked for a national system of roads, suggesting that the president appoint a committee to report on the best method of giving federal aid.

They demanded the use of convicts in road building.

They demanded states to create highway departments and to aid in highway construction and maintenance.

They even went so far as to indorse the Lincoln highway, the Old Trails highway and recommended long tenure of highway officials as well as investigating of applications for patents on inventions for road building.

Lowe's National Highways

Naturally national highways came in for the lion's share of attention and each delegate, who had his name on the program, considered it his sacred duty to say something on what the Washington government should do towards improving main trunk lines as well as country back lanes and city alleys. But it remained for fiery Judge J. M. Lowe, of Kansas City and President of the Old Trails trans-continental highway to add the keystone to this new theory of national aid. Judge Lowe does not believe in national or federal aid. He believes in a national road system. He wants Washington to build and maintain such a system. Here is how the Judge puts it:

"The national government should build and maintain its national roads. There," pointing to the Detroit river, "is the greatest highway in the world. Do we turn it over to the State of Michigan? No. And the Supreme Court of the United States has stated that there is no difference between transportation on water and land. Congress has given six billions of dollars to highways by water, but ask this Congress for money to build roads and they say, 'We will give you money if you will raise an equal amount in the States.' Congress did not make such a bargain with its rivers and harbors. Then why do so with the roads? Do we say to turn the Mississippi river over to the control of the states bordering on its banks? No. On the other hand, Congress controls it. What a condition of trouble would there be were its control in the hands of these states. Its value to the nation would be greatly impaired. What applies to water highways applies to public roads. Congress or the national government should build its system of national highways and maintain them. The states should build their state highways needed to supplement these national highways, and the counties and townships should do their part to complete the system.

"Congressman Shackleford, of Missouri, wants to build a million miles of roads in 5 years. What does this mean? On a basis of $10,000 per mile it is an expenditure of $10,000,000,000 in 5 years or $2,000,000,000 annually. This means national bankruptcy.

"Senator Bourne proposes a bond issue extending over 50 years, carrying 4 per cent. interest. With such a plan the national government agrees to cancel these bonds at the expiration of 50 years. Why should they not? Because the face value of the bonds has been paid twice over by that time.

"Unless a road is of national character, it should not be built by the national government.

"The Swanson bill says: 'I am in favor of national roads provided the state will raise dollar for dollar and then we will have joint ownership.' Divided ownership and responsibility will never work. Let us stand for a system of national roads built and maintained by the national government and a system of state roads built and maintained by the states."

Congressman Shackleford's system of building highways got little sympathy at any part of the road convention. It was apparent that he was not traveling along the same line of thought that satisfied the majority of the delegates. A majority of the speakers felt called upon to ridicule his system.

The Ethics of Road Building

A road convention is only a success in proportion as it brings out all the varied aspects of road construction and in this respect the present congress has placed a new high water mark. It has been generally accepted that improved roads bring millions to the farms but N. P. Hull, a member of the legislative committee of the National Grange, the national organization of the farmer, touched a new chord when he showed that the exodus from the farm to the city must be stemmed if the cost of living is going to be kept normal.

"The farmer," according to Mr. Hull, "should get a clear share of the good roads. Build your national highways, build your state highways, but no further, and give a fair portion for the improvement of the highway between the farmer's home and his market place. The farmer today is ready to meet the automobile man and pay his share of road cost, provided the funds are equitably distributed, but he is not interested when the road built does not come within a hundred miles of his home. We, as farmers, have no objection to transcontinental highways or to state highways, providing you spend part of the money between

the farmer's home and his market. That is the important thing.

"We must stem the movement of population from the farm to the city, and good roads will help in this work. Thirty years ago two out of every three of our population were on the farm, providing the food for the three. But today, but one of the three is on the farm and the other two are in the city. Today, one has to provide the food for the three.

"In a recent canvass of one county in Michigan, it was shown that the average age of the men working the farms is 55, in other words, the younger generation has gone to the city."

Patrol System Is Impossible

The Honorable John N. Carlisle, chairman of the New York commission of Highways gave the quietus to the patrol system of road maintenance in the Empire State, which has voted a total bond issue of $100,000,000 for roads, when he remarked:

"The patrol system in the State of New York for 1913 has cost $600,000 and we might just as well have thrown $500,000 into the sewer. We are going to adopt a new policy for next year, fashioned after the section gang principle of railroads. Each section gang will have a territory to maintain and we will provide each with a steam roller, a pressure oil square and a motor truck. In this way we hope to secure efficiency in road maintenance."

Limit Weight by Tire Width

Colonel William D. Sohier, Chairman of the Massachusetts State Highway Association, was able to get away with a home run on the question of limiting the weights of motor trucks on highways as well as placing restrictions on tire widths, largely because nobody else was prepared to discuss the question. The Colonel visited England, France and Germany and was filled to overflowing with everything vital in truck legislation.

After citing how overloaded motor trucks have broken down culverts and bridges in New England he explained the English method of limiting the permissible weight on a truck wheel by limiting it to 800 pounds for every inch of tire width. He also recommended limiting the speed of a motor truck which represented a total weight of 6 tons to 6 miles per hour if shod with steel tires and to 12 miles per hour if shod with rubber tires. His recommendations favored barring vehicles representing a total load of 14 tons from the highways excepting by special permit and that these permits stipulate that the owner of such truck be compelled to make good to the state any damages done to bridges or culverts when passing over them. He further favored having all bridges posted with the permissible loads they will carry as well as allowing corporations to restrict the speed to 4 miles per hour over bridges which they so posted.

Michigan in the Lime Light

Friday's session was somewhat local in character, being given over to the annual meeting of the Michigan State Good Roads Association, which returned to office all of its old board, with Philip Colgrove as president. The report of the retiring officers showed considerable progress in the last year, 524 miles of roads having been constructed in the 12 months from June to June, while the state paid out $329,392 in rewards to the builders of the new highways. Of this total 344 miles were gravel, 112 macadam and 22 concrete.

The addresses brought Governor Ferris of Michigan to the rostrum and the state's chief executive made it perfectly plain to his hearers that he is a firm believer in good roads and that he would give all the assistance in his power to make Michigan rank as high as any other state. The governor went over all the old arguments of the good done the community at large by improved highways and his remarks brought forth considerable applause from his hearers.

J. C. Ketchum, master of the Michigan state grange was just as enthusiastic as was the governor and declared that the farmers are for federal aid but not the sort that contemplated Uncle Sam having charge of only the through routes. Mr. Ketchum says that the kind of a federal road the farmers want are those that start at the farm and go direct to the market place. There are 60,000 members of the Michigan state grange and 900 local granges and Mr. Ketchum promised that if good roads literature is sent him that he will have the grange's lecturers spread the good roads propaganda at the thousands of meetings of the farmers that will be held this winter.

Atlanta for 1914?

Saturday's session was largely devoted to invitations by the various cities which want the road congress for 1914 and 1915. Seven cities have presented invitations as follows: For 1914, Atlanta, New Orleans, Denver and Peoria. For 1915, Spokane, Los Angeles.

It is probable that Atlanta will get the convention next year and that the congress will go west in 1915, according to the sentiment on the last day. No decision will be made as to this however, for about 4 months, it being left to a committee to investigate and report. Scretary Pennybacker will visit each of the cities and on his reports the decision will largely depend.

In 1912 the congress was not a financial success, but this year it paid expenses. A gain of about 300 in membership was shown by the secretary's report and about 100 of these are Detroiters.

Asphalt Interests to Fight

It was gossiped around during the convention that the asphalt forces have come together and raised a fund of $50,000 with which to combat the concrete army in the Lincoln highway movement. The Lincoln highway people are pledged to use concrete wherever possible, while the makers of asphalt are going to make a vigorous fight to get their share of the business, it is said.

They Rule for 1914

The election of officers resulted in practically the re-election of the old ones with a few additions to the directorate, chief among which was that of R. D. Chapin of the Hudson company, the sole representative of the automobile interests. The officers are: President, Logan Waller Page; vice-president, W. W. Finley; secretary, J. E. Pennybacker; field-secretary, C. P. Light; treasurer, Lee McClung, and directors R. D. Chapin, Detroit, A. B. Fletcher, New York, C. W. Baker, New York, L. W. Parker, South Carolina, together with James S. Harlan, Alfred Noble, Thomas G. Norris, Joseph W. Jones, and L. E. Johnson, who with Messrs. L. W. Page, W. W. Finley, A. B. Fletcher, Roy D. Chapin, Charles Whiting Baker, Lee McClung, Walter H. Page, B. F. Yoakum, Leonard Tufts, W. T. Beatty, Coleman Du Pont, John J. Duff, J. Hampton Moore, John M. Goodell, E. J. James, George C. Diehl, Bryan Lathrop, and John B. Thayer will govern the affairs of the association for another year.

Brick for Country Roads

James M. McCleary, road engineer for Cuyahoga county, Ohio, which is renowned for its 400 miles of brick roads, said that there are at present petitions from thirty-three farmer groups asking for as many exensions of the present brick country roads. These brick highways are in good shape for the severest traffic 12 months in the year.

A satisfactory plan for an average rural pavement may include a paved portion anywhere from 9 to 16 feet in width, the width being controlled by the amount of traffic to which the road is subjected. A dirt or gravel macadam should occupy the balance or unpaved portion of width. Whatever dimensions are adopted, the surface drainage should be over the pavement toward a ditch on the side of the road closest to the pavement, eliminating a crown from the paved portion. The unpaved portion should be drained in the opposite direction.

The first brick road in Cuyahoga county was started in 1893 and completed in 1895 and located on what is known as the Wooster Pike in the southwest portion of the county. The wearing surface was of standard size brick, 8 feet in width, tar filled, placed between stone curbs, 3 inches by 15 inches and resting upon a 6-inch broken stone base. The pavement was placed upon one side of the roadway with a graded earth drive occupying the balance of the width. No drainage was provided.

The pavement being but 8 feet in width, all of the traffic came in one place. Lack of bond and absence of uniform support caused a depression to appear. In the wet season, this rut or groove filled with water which soaked through the base, creating a worse condition from day to day during the damp seasons. The colder weather brought upheavals and such havoc that many sections of the improvement (so called) were a hindrance rather than an aid to the traffic.

The next road was eight feet in width, tar filled and placed between flush stone curbs on a 6-inch broken stone base. We placed a 6-inch drainage tile beneath the center of the roadway. It was taken up 3 years ago to be replaced by a 30-foot roadway; its condition was such that by contrast not every town or county could point a finger of scorn at it.

The Lorain road was built 16 feet wide, tar filled and resting upon a crushed stone and slag base between flush curbs, with drain tile beneath each curb.

Our next great forward step occurred when the tar filler gave way to a grout filler composed of one part sand and one part cement. This plan was followed until 1905. The cement filler alone could not cure all of the defects due to inferior drainage and frost action. Another step was therefore decided upon, the inclusion in the specifications of a requirement for a four-inch concrete foundation which, of course, increased the price. State Road No. 2 was constructed under this plan, the increased cost brought immediate opposition, resulting in a temporary return to broken stone or slag base until 1908, when concrete was again adopted as a foundation and continued up to the present time.

Twenty Operations To Make Knight Sleeve

Stearns Factory System Cuts the Time on Machining Processes—Motion Study Develops Plant Efficiency

TWO years ago the Stearns Co. of Cleveland adopted the Knight sleeve valve as standard construction for its engine and discontinued the poppet valve entirely. This meant the beginning of new factory processes and machine operations. And as extreme accuracy of manufacture is required for these sleeves much experiment to discover economical, accurate and rapid methods of putting through the orders was carried out.

As a result of these experiments and the application of rules of factory procedure on lines established by Frederic Taylor there has been evolved an operating system of great interest.

Though this systematic method of proceeding with the machine operations in the factory is, of course, applied to the manufacture of all parts of the engine, a good general idea of its excellence may be obtained by confining attention to the manufacture and recording of the sleeves only.

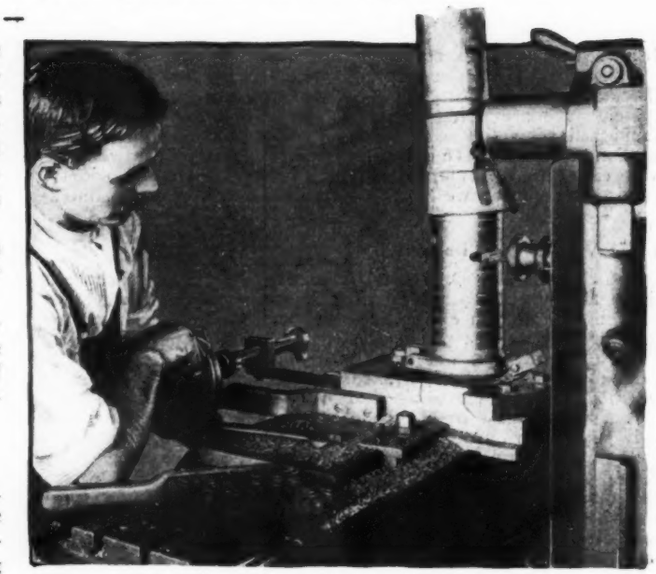


Fig. 1—Cutting the valve ports in the Knight sleeve at the Stearns factory

System Controls Factory Procedure

The system is such that it could almost be termed automatic. That is, once an order is started from the office the progressive operations in the factory are set moving at a rate and, consequently, cost that is known almost exactly beforehand. Owing to lack of precedent many of the machining processes on the sleeves have been evolved in the Stearns factory and the system of controlling and recording them has grown up with their adoption.

The form of the Knight sleeve is well known to readers of THE AUTOMOBILE and very little thought is required to realize how accurately they have to be machined. There are two sleeves to each cylinder, an inner and an outer, and the necessary machining on each is practically the same, so that all sleeves can pass through the same line of machines in the process of manufacture.

Orders are issued for batches of fifty inner or outer sleeves at a time, and on the final delivery to the stock room it is known by the record forms used how much time was spent at every machine, and at which particular machine any fault in the casting developed or any operator's mistake was made. No scrapped sleeves, even if the disqualification takes place on the first machine, are removed from the batch of fifty to each order number. The scrapped pieces are naturally few, but they are nevertheless always carried along with the sound ones.

A somewhat peculiar form of truck, Fig. 2, specially designed for the purpose, is used for the conveyance of the sleeves from machine to machine throughout the shops. This truck is capable of carrying fifty sleeves and thus every truck load represents an order number. As will be seen, the truck consists of a double set of steps on which wooden pegs or uprights, five to a step, are mounted. The sleeves are simply slipped over these.

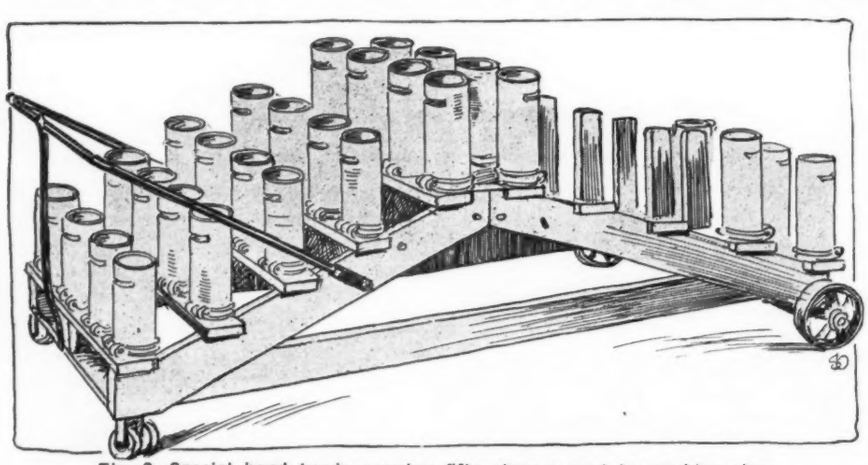


Fig. 2—Special hand truck carrying fifty sleeves used in machine shop

Cards Record Every Operation

The record forms used in the Stearns factory are shown in Figs. 3 and 5. They are designed in such a way that the manufacture of any parts, whether standard or special, can be easily kept track of. Taking the system in steps from its initial point of application in the design room, through the shops and ending at the stock room, the procedure is as follows:

First, the drawings pass from the designer to the process department where the most economical machining methods and processes are decided upon. These are entered in sequence on the Route Sheet, Fig. 5. This sheet is then handed to the planning room in the factory and the order number, description and the list of operations are transferred to the inspection card, Fig. 3. This is a blue card 9 inches by 7, on the left of which, as shown, the machine operations are entered and numbered in sequence. The planning department then decides on which particular machine each operation will be most eco-

THE F. B. STEARNS CO.
PROCESS DEPT.
PIECE SYMBOL

PROGRESS IN DESIGN, CONSTRUCTION AND INSPECTION OF NEW TOOLS AND FIXTURES. 10351

PATTERN No. 10351
DESCRIPTION Inner sleeve
MATERIAL Cast iron
ROUTING

OPERATION NUMBER	DESCRIPTION OF OPERATION AND TOOLS REQUIRED	STANDARD MACHINE	CHECK DATES IN RESPECTIVE COLUMNS: LOCATION
1	Sand blast on lug end	Sand	Blast
2	Set up for operation #3	1LTC3	D2M4
3	Rough bore + face to length to adapt	1LTC3	"
4	Rough turn	10LH2	D3M3
5	Finish turn + cut oil groove	10LI1	"
6	Finish face to length	8LE2	D3M1
7	Drill oil holes to jig	10HV2	"
8	Rough grind outside	16X2	D3M2
9	Set up for operation #10	1LTC3	D2M2
10	Finish Bore	1LTC3	"
11	Mill 1-3/16" slot	5MH	D3M4
12	Mill ports	3MH2	"
13	Mill spiral oil groove	8MH2	"
14	Bevel ports	7MH1	"
15	Drill 31/64" hole to jig + 1/4" tap hole	10R3	D3M1
16	Drill collar holes to jig	1V4V3	"
17	Grind internal	16M3	D3M2
18	Finish grind outside	16X1	"
19	Ream 31/64" hole + hand tap 1/4" - 20 tap	1VM3	D3M2
20	Inspect		

DEFECTIVE MATERIALS
NAME OF PART Inner sleeve
ORIGINAL NO. PCS IN LOT 50 SYMBOL 10351 LOT NO.
REC'D FROM
NO PCS. DEFECTIVE ✓ CHARGED TO ORDER NO.
NO PCS. DAMAGED HOW DEFECTIVE Bore too large
NAME OF WORKMAN John Smith OPERATION NO.
GANG BOSS IN CHARGE JM23
INSPECTED BY DATE

Fig. 3—Inspection card used in Stearns factory. Example is filled up for manufacture of inner sleeves and shows consecutive machine operations. Fig. 4—Below, defective materials tag, which is attached to any part developing fault or otherwise rendered useless through mistake during manufacture

nomically performed on, and enters this by symbol in the column in the center. Every machine carries a symbol denoting the kind of machine and its location in the factory. The card is then ready to pass through the departments with the order, being checked by inspectors as the machining proceeds in the columns at the right.

Some explanation of the meaning and use of the location symbol may be desirable. The letters denote the department and the particular machine and the final figure shows in which quarter of the floor the machine stands. These symbols are guides for the trucker whose sole business is to keep the batches of parts moving from machine to machine. No time is lost by the operator. The parts come to his machine and are removed to the next automatically. His attention is only on his job.

An inspector is at the call of the machinists on every floor and no part can pass from one machine to the next without his sanction. His affirmative mark in the columns on the right of inspection card, Fig. 3, is an intimation to the next machinist that the work is to proceed.

All Faulty Parts Are Tagged

Should any defect arise it is discovered by the inspector who affixes a defective materials tag, Fig. 4 to the spoiled part, thereby preventing any subsequent machining which would represent a dead loss. Complete information is entered on this tag; order number, name of part, how defective, and the names of workman and inspector. The tag is a bright green color and being immediately visible to the machinists at all subsequent operations the marked parts are simply allowed to remain untouched on the truck.

Turning now to the particular operations in the manufacture of the Knight sleeve as performed in the Stearns factory, there are twenty in number as shown on the inspection card, Fig. 3. This includes setting up for the more difficult operations and the final inspection, so that the actual number of machines passed through is less than this figure.

How the Sleeves Are Machined

After cleaning the casting by sand blast the sleeve blanks are set up in a boring machine which cuts to length and rough bores the interior. Then a finishing cut is given to the outside. In the next machine the sleeve while on an arbor is faced up accurately to length by two tools in a single movement. The oil holes are then drilled, after which the first rough grinding is proceeded with. This brings the outside diameter to within a thousandth of an inch of the finished size. The inside is then subjected to the finishing bore cut prior to grinding. For this latter operation the sleeve is held by the outside in a jig. The sleeve then passes to a milling machine where the slot which receives the upper end of the valve connecting rod is milled.

Next, the sleeve is placed in the milling machine, Fig. 1, and the ports cut. This is an operation requiring the utmost accuracy and is extremely interesting in that this necessary accuracy has been obtained without presenting any difficulties to the operator. Further, the machine is so arranged that it is al-

(*Continued on page 675.*)

ROUTE SHEET
THE F. B. STEARNS CO.
PIECE SYMBOL 10351

DESCRIPTION OF PIECE Inner sleeve DRAWING No. 10351
REMARKS Cast iron casting PATTERN No. 10351
WEIGHT EACH

	1	2	3	4	5	6	7	8	9	10
DATE ORDERED	7-16	8-1	8-4							
DATE WANTED	7-30	8-12	8-18							
Lot No.	21	22	23							
CHARGE TO	X	X	X							
ORIGINAL NUMBER OF PIECES IN LOT	50	50	50							

Previous Time Allowed	Op. No.	DESCRIPTION OF OPERATION	Alternative Machine	Standard Machine	Location	Operation Number

Fig. 5—Head of route sheet, which shows sequence of operations in the manufacture of machined parts in the Stearns factory

Sidewalk Gasoline Pumps Draw Transient Trade

Attractive Pump Housings in the Form of Illuminated Posts a Fetching Garage Advertisement

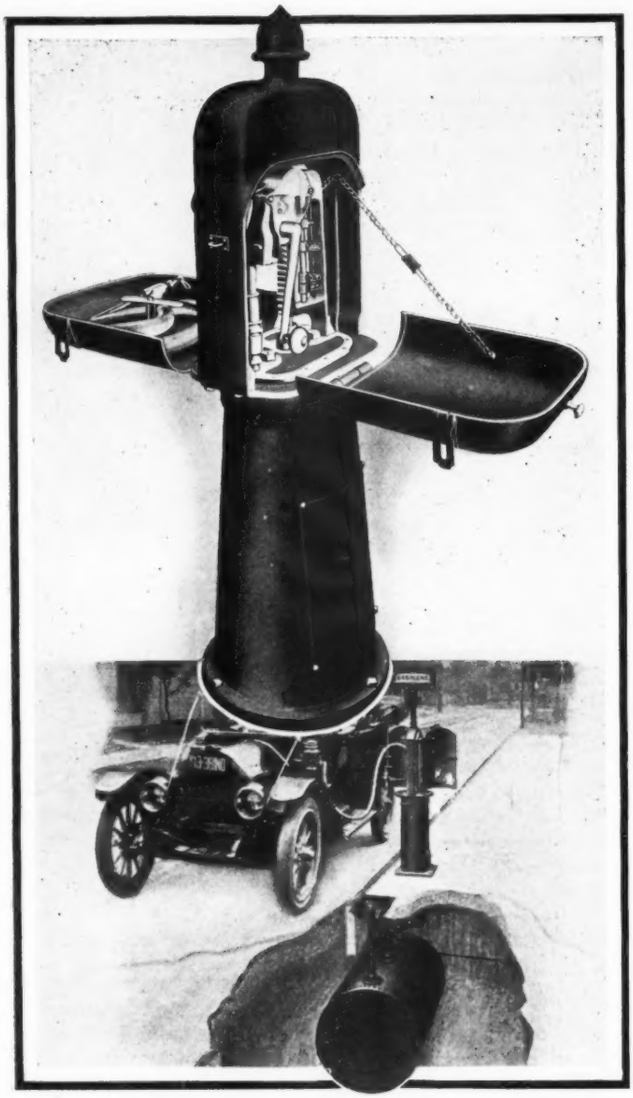


Fig. 1—At the top is shown the curb post forming the pump housing of the American pump. The lower half of this illustration shows the Red Sentry installation of the Bowser company

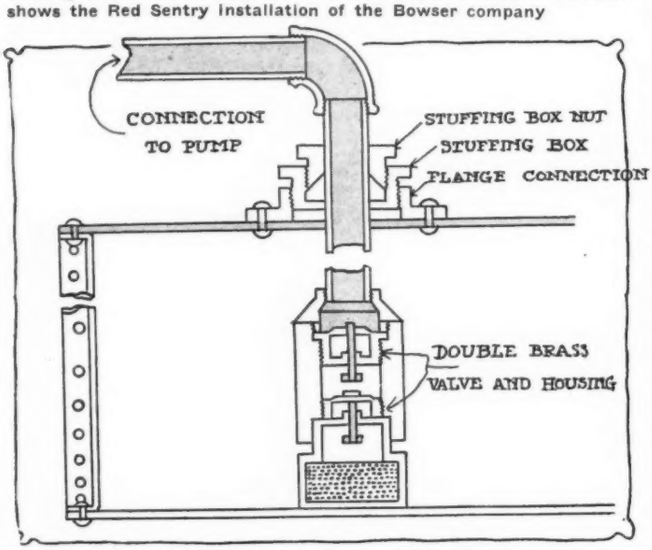


Fig. 2—Sectional view of the galvanized steel tank made by the United States Pump & Tank Co. The V-shaped removal screen in the head of the filler pipe acts as one strainer, the screen at the base another, and that of the brass valves acts as a third

GASOLINE curb brokers are becoming numerous throughout the country. The tourist will notice as he passes through small villages and even through the larger cities gasoline pillar boxes which fulfill the double purpose of acting as a signal for a gasoline supply station and as a convenience for filling the tank without the necessity of driving the car into the garage.

This system of selling gasoline is safe. Not a drop is handled indoors or by the dangerous portable cans and the most rigid laws on the handling of gasoline are complied with. The pump contained in the pillar box has a measuring device upon it so that the entire outfit necessary for filling the tank of the transient traveler is contained within it.

Briefly the installation of a curb selling system for gasoline consists in an underground tank which is buried beneath the sidewalk level or somewhere else in the ground outside of the line of the walls of the garage, a vent to this tank filler opening and piping to the pillar box and the pump which may be located within the garage on the concrete floor.

There are at present at least ten makers of this system of garage selling outfits. They are all along the same lines as far as the principles of operation are concerned, but vary in the details of their construction. In order that a clear conception of each may be obtained they are discussed separately.

S. F. Bowser & Co., Fort Wayne, Ind.—Under the name of Red Sentry the Bowser Company makes a sidewalk pump with the self-measuring feature. The installation of this system may be seen from Fig. 1. It consists essentially of a self-measuring Red Sentry pump and an underground storage tank with connecting pipe. No pressure is used in the pressure or distributing system, the pump being all of either suction or force type, the power all being in the pump itself. Any competent plumber can install the system and the tanks in use vary in capacity anywhere above 65 gallons. The pump is located at the curb and occupies a space of 12 inches by 14 inches on the sidewalk. It is so designed that it discharges, at a single stroke, a gallon, half gallon, quart or a pint. It is only necessary to set the pump at the desired quantity by adjusting a small quantity lever. The two hinged doors on the pump lock automatically when closed, thereby preventing unauthorized persons from drawing gasoline. Within the base of the pump is an automatic filter which thoroughly cleans the gasoline of water or impurities. The pump can be equipped with an electric lamp attachment having a white glass globe with the word GASOLINE in red glass letters. The pump is also equipped with a meter which registers all gasoline drawn up to 10,000 gallons. This enables the keeping of an accurate record of all gasoline sold and in checking sales against purchasers. A discharge register tallies the number of gallons pumped from one to ten and then repeats. This is of good use in filling automobile tanks. If desirable another pump can be located inside the garage and connected with the same tank.

American Tank & Pump Co., Cincinnati, O.—The curb post shown at the top of this page is manufactured by this concern and is noted by the fact that it is equipped with a double acting continuous flow gallon measuring pump having all its valves accessible. The entire mechanism is exposed by letting down the sides as shown in the illustration, or by removing the cover plate at the lower part of the pump housing. The pump

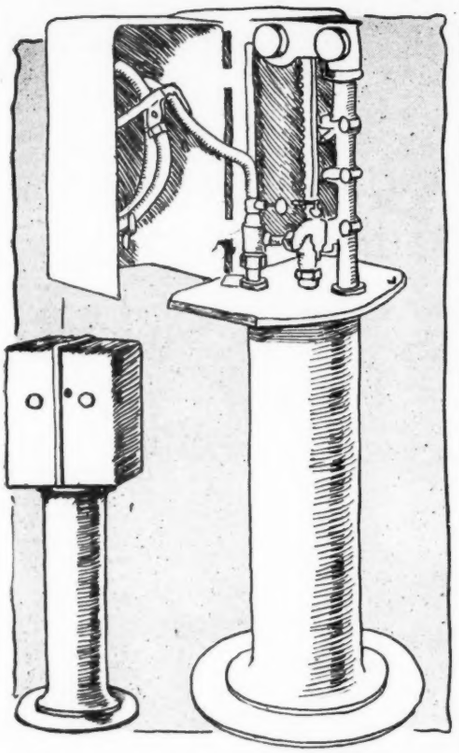


Fig. 3—The curb box pump of the Western Oil Pump & Tank Co. in its opened and closed positions. This box when made up in red furnishes a conspicuous gasoline station

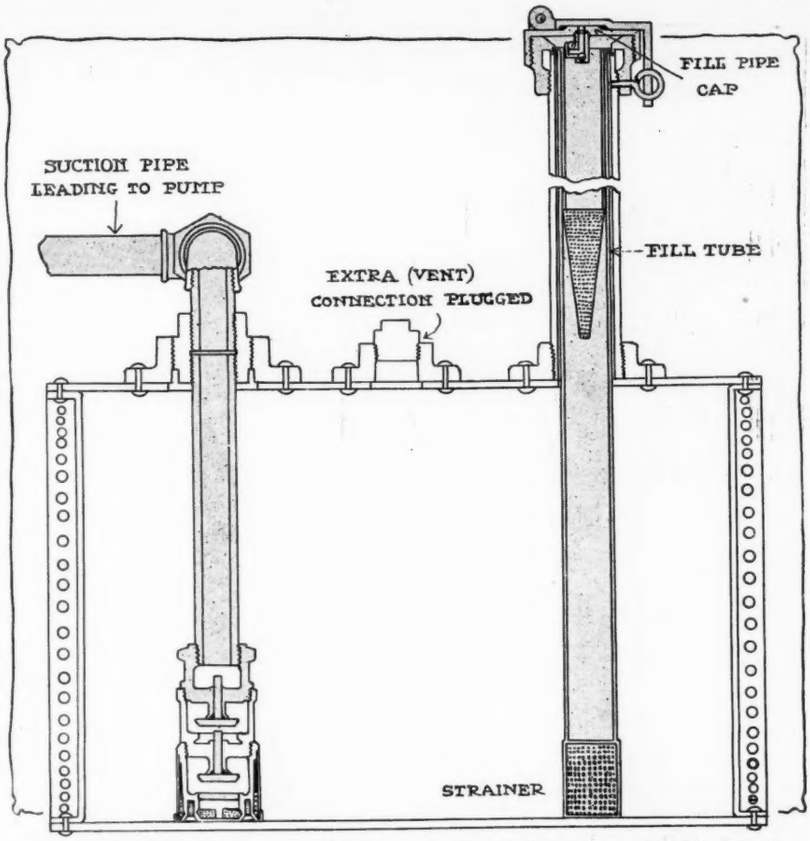


Fig. 4—Sectional view, showing the construction of the Bowser cylindrical tank

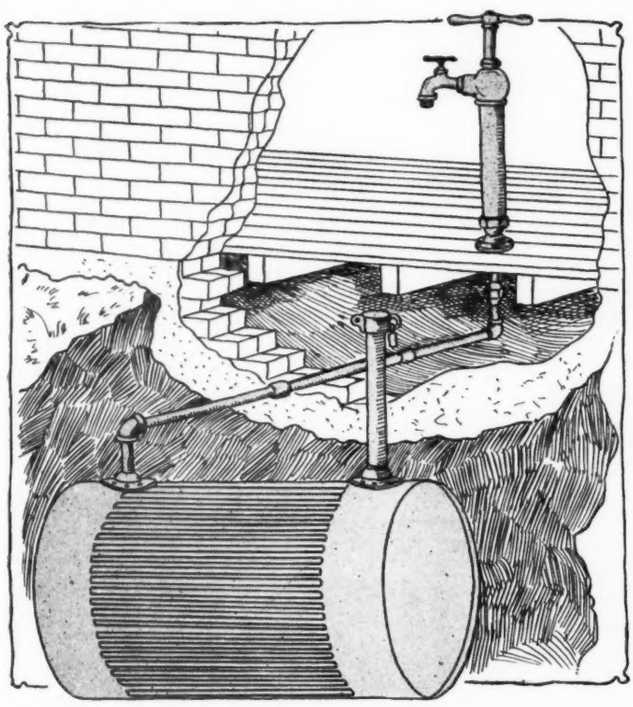


Fig. 5—Tank used in connection with the Savo-Safety gasoline storage system. The pump for this system may be either fitted indoors or outdoors and has a brass faucet threaded for a hose connection. The pump has a strength sufficient to lift the contents of the tank a distance of 18 feet on a direct lift. The galvanized iron pipe used in connection with installing this system is made in 4-foot lengths and is furnished with two malleable elbows, one union and two couplings. The system can be installed quickly by any competent plumber

housing casting is in one piece with independent drop-down door and the flange at the bottom is broadened to take bolts for fastening the pump to a concrete floor or sidewalk.

The outfit consists of the pump, 8 feet of hose, portable nozzle, integral filter, and the gray cast iron cabinet, which is painted. Above the doors the sign GASOLINE is a part of the casting. The principal patent owned by the manufacturers of this outfit is that on the double-acting gallon measuring feature. The filler pipe is equipped with an automatic ball-vented fill cap, which prevents the gas from escaping when the pump is not in operation. It is claimed that the double-acting pump will charge a car in one-half the average time required.

The Tokheim Manufacturing Co., Cedar Rapids, Ia.—The Tokheim curb pump post is distinguished by a double illuminated drum sign at the top. The post is fitted with two electric lights and it is only necessary for the purchaser to run his wire to the post. The glass circle for the sign comes with the post. The pump used in connection with this outfit is a double acting Acro pump which has a capacity of 20 gallons per minute. The filler pipe is carried to the ground at the curb so that the tank can be filled from the gasoline wagon by running the pipe directly into the filler opening. No pressure is used on the system, but the pumping is done directly by the pump contained in the curb post. Air does not mix with the gasoline, as the supply pipe at the bottom at the inside of the tank to the pump discharge nozzle is always full of gasoline. It is not necessary for the factory to make the installations, although careful plumbing work is necessary to secure tightness at the elbows or other joints. Tanks of any capacity are supplied and it is recommended that garage men purchase as large a capacity tank as possible owing to the greater convenience of having a less number of visits necessary from the source of supply. The installation of this outfit is illustrated in Figs. 7 and 9.

The Vac Liquid Equipment Co., Cedar Rapids, Ia.—A good idea of the layout of the Triune system made by this company is given in Fig. 10. It is known as an electric gasoline equipment

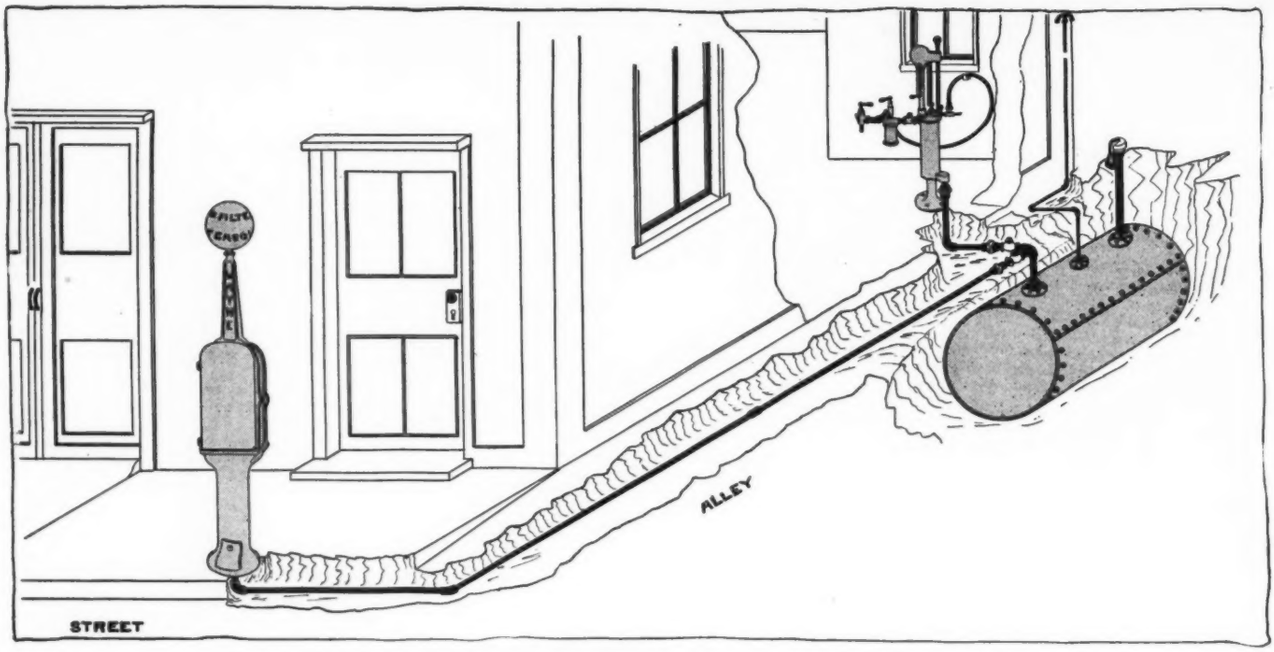


Fig. 6—Wayne installation with tank buried in alley and pump in garage and at curb

on account of the use of electric motor and control features. The system consists of a pump, electric motor, separator and as many meters as desired. The piping, etc., is generally furnished by the local plumbers by whom it is installed. It is not necessary to send a man from the plant to install the system, as there are no complications except the electric wiring, which would have to be done anyway by a local licensed electrician. The pump and tank capacities can be made as large as the purchaser desires, installations having been made with this system in which the pumps have a capacity of 1700 gallons per hour. It is ordinarily found that 500 to 600 gallons per hour is satisfactory to the public garageman. The pump is not operated by hand power in this case, but by the electric motor, while the gauge at the pump tells the operator how much gasoline has passed into the tank he is filling. Stop meters set for 5, 10, or any number of gallons desired are furnished. With this type of meter when the required amount has flowed into the tank the flow of gasoline is automatically shut off.

Western Oil Pump & Tank Company, St. Louis, Mo.—The Western roadway filling outfit comprises a cabinet made of heavy cast iron, a hand-operated pump measuring gallons, half gallons, quarts or pint at a stroke, a gallon meter that checks all the gasoline drawn up to 10,000 gallons, a filter which strains all gasoline drawn and a discharge register which automatically tallies every gallon pumped from zero to 10 gallons. The supply and piping equipment consists of a tank of heavy galvanized steel made in any desired capacity, a two-way nozzle, one for connecting hose, the other for filling cans, a hose and filling nozzle, 6 feet of gasoline hose and a special filling nozzle. The box, which is shown in its open and closed position in Fig. 3, is finished in vermillion enamel with nickel trimmings, giving it a conspicuous appearance as it is mounted on the curb. The box is locked by a six-tumbler lock and cannot be tampered with by unauthorized persons. This outfit takes up but very little room and when used to supplement the pump within the garage gives the garageman a complete outfit for transient or steady trade.

Anchor Brass Works, Chicago, Ill.—The system made by this concern consists of a tank, pump, filler pipe, strainer, lock cap and a complete set of pipe and fittings ready for immediate installation without the purchase of extras. The special feature in connection with this outfit is the double-acting high-capacity pump. It is made throughout of non-rusting brass material in accordance with underwriters' specifications. The system is

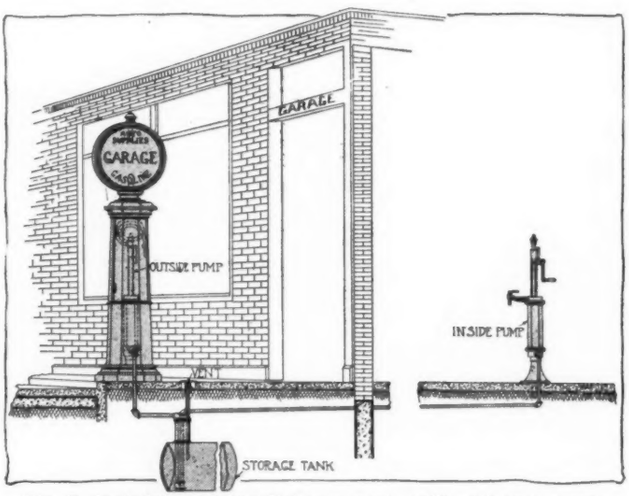


Fig. 7—Installation of the Tokheim post outfit with two pumps

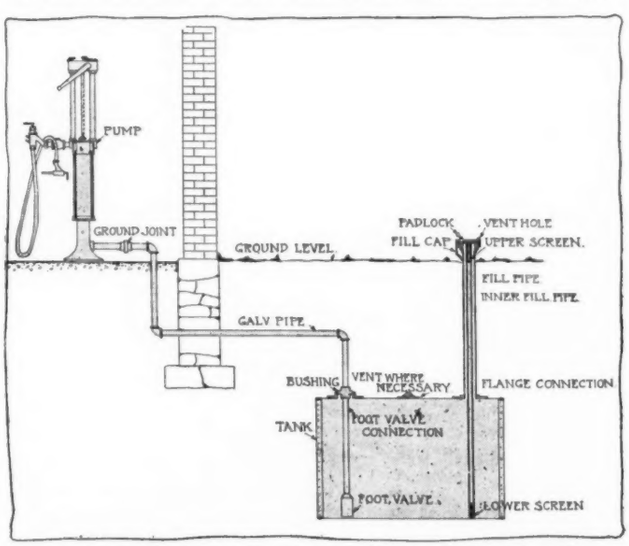


Fig. 8—Installation of the U. S. underground storage system

equipped with a self-measuring pump which has been recently brought out by this concern and which permits the gas to be measured directly at the curb. The tank used in connection with this system is that shown in Fig. 7. It can be secured in any capacity desired and a pipe may be run off to a garage connection such as that shown in the illustration if desired. The connnection shown here is for the purpose of filling 5-gallon cans, etc., but this may be substituted by a self-measuring interior or exterior pump.

Wayne Oil Tank & Pump Co., Fort Wayne, Ind.—A typical Wayne installation is shown in Fig. 6. This is the layout used where the proprietor of the garage wishes a pump on the street and another in the garage, with only one storage tank. The Wayne sidewalk pump is constructed of very heavy cast iron which usually sits on the sidewalk at the curb line. The pump and mechanism is inclosed in a heavy cast iron cabinet. The doors of the cabinet are held in place by a double bolt lock, and inside is coiled a length of special gasoline hose terminating in a filling nozzle. This hose is of sufficient length to permit the gasoline to be discharged directly into the reservoir of the car. The tank is buried at any convenient location and at any reasonable distance from the pump. The pump is fitted with a double discharge, one through the hose, and the other in a lever of shut-off nozzle, which permits the operator to pump gasoline into a receptacle or can The construction of the discharge is such that when one is in use the other is automatically shut off. It is impossible to discharge gasoline through both discharge openings at the same time. The installation consists of a pump complete, with or without electric light attachment, filter, hose, 100,000 gallon meter, underground tank, complete with foot valves, fill pipe, etc. Pump is a combination suction and force type and there is no pressure on the contents of the tank at any time. An expert is not required to assemble the outfit.

United States Pump & Tank Co., St. Louis, Mo.—The principal features of the United States installation are shown in Fig. 8, consists of a tank, pump, fill pipe and foot valve. A special feature which is distinctive of this installation consists of mortising a lock in the head of the gearcase, together with a regular bar and split measuring device, which assures easy pumping. As a rule there is no pressure used in the gasoline storage system used by this company, and no pressure is ever used in connection with the gallon stroke pump, as the pump itself is powerful enough to do all the lifting necessary. Burying the tank underground prevents evaporation and maintains the gasoline at the same temperature all the year around, thus preventing it from expanding and sweating. The pump itself can be mounted either inside or outside of the garage and is furnished with gauges and a long filler-nozzle, which can be used for putting the gasoline directly into the tank of the car. The installation is simply made, as would be seen from the piping diagram given in Fig. 8. The vent hole is brought up just above the surface of the ground and is used in combination with a padlock filler opening. Galvanized piping is used throughout and the joints are made tight with litharge. A ground joint connects the pump standard with the piping from the tank. This concern does not use brass valves, but have a special composition which consists of five metals.

Wahlmann Mfg. Co., Milwaukee, Wis.—The curb post manufactured by this concern is that shown in the upper half of Fig. 9. The post shown in this illustration contains a hand-operated self-measuring pump which can be regulated so as to take a gallon at a stroke, a half gallon or any other fraction. The discharge consists of a long pipe made of special gasoline hose tipped with a special filling nozzle, which permits the gasoline to be forced directly into the tank of the automobile being served. A feature of this post is the drum-shaped illuminated sign labeled "GASOLINE" at the top of the post, which fulfills the double service of acting as an advertisement and of indicating the fact that the store or garage having this post before it deals in this fuel. The tank may be stored directly beneath the post or at any other point within a reasonable distance of it, and if

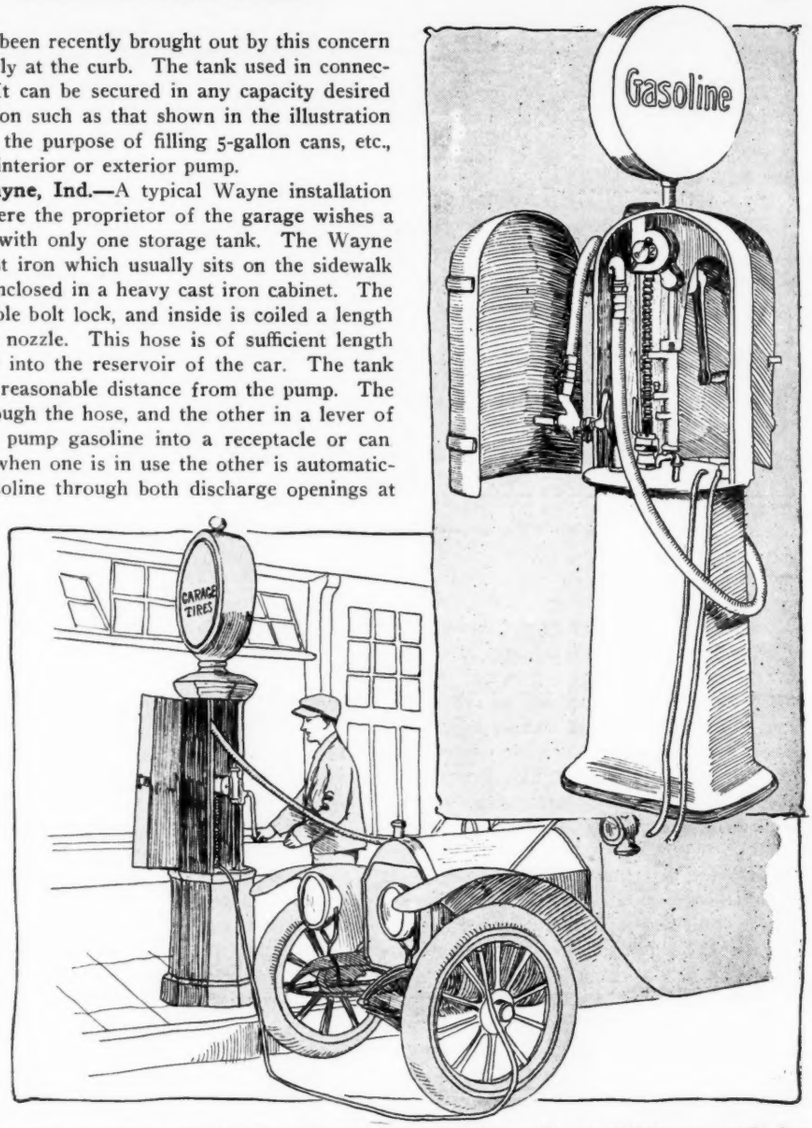


Fig. 9—Upper—Illuminated post used in connection with the Wahlmann outfit for exterior or curb selling. Lower—Filling a tank from the curb post outfit supplied by the Tokheim company in which the amount of discharge per stroke can be regulated

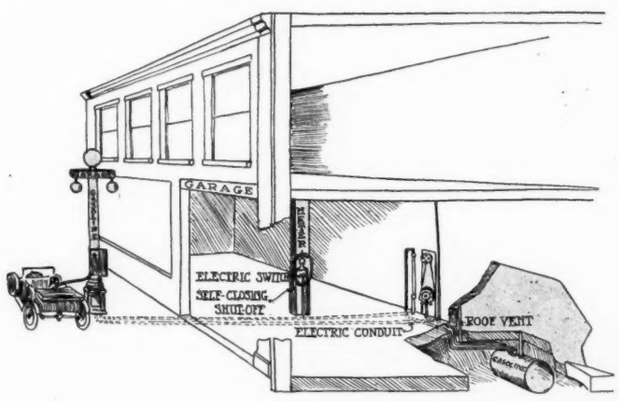
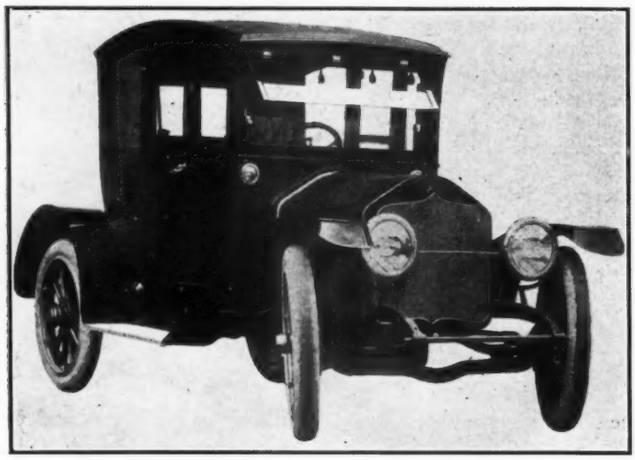


Fig. 10—Layout of the electric gasoline equipment made by the Vac Liquid Equipment Co., in which the pumping is done by an electric motor, and the control is by an electric switch, doing away with any manual labor in filling the tank of a car. Note the conspicuous curb post housing the gasoline pump. The installation of such an outfit as this is elastic in that the tank may be buried outside the walls of the garage and the pumps can be put anywhere that is most convenient for the proprietor of the garage



Quarter front view of the new National coupé

desired two lines may be taken from the tank, one for an internal pump and the other for the curb post. The pump has a gauge which registers every gallon that is pumped into the automobile tank. At night or when not in use the box can be locked and the gasoline hose stored within it, rendering it safe against handling by unauthorized persons. In the illustration the two electric wires are shown hanging outside the box, but in a practical installation these wires are concealed.

Gilbert & Barker Mfg. Co., Springfield, Mass.—The outfit made by this concern consists of a self-measuring pump inclosed in an attractive cabinet to be placed on a curb as a combination signal for the purpose of showing that gasoline is sold and to act as a housing for the self-measuring pump. The tank containing the gasoline supply is buried in the ground at any convenient point and a pipe run from the tank to the pump through its base. The tank is also provided with a fill pipe projecting slightly above the surface of the ground and fitted with a lock cap and a vent pipe. The installation may be made by any plumber. The Gilbert & Barker measuring pumps are distinguished by the fact that they are arranged so that each measure and the pump itself can be adjusted and sealed by any official sealer of weights and measures. This complies with the law in some places which states that measuring pumps must be sealable. The stops on the pump which determine the length of the stroke and thus permit the measuring of smaller quantities than the pump's capacity are swung on a heavy threaded rod. This gives a fixed adjustment. For the benefit of the garageman who does not desire to put his pump on the sidewalk, a round cast iron box on a standard partaking of the nature of a round patrol box containing a filling cock with a length of hose on which an anti-drip nozzle is fitted. A bell is fitted on the die device so that an automobilist may draw up to the curb and without dismounting from the car press a button to attract the attention of those inside. Gasoline is then discharged by means of the pump inside the garage. The tank is stored underground in the usual manner and can be made in any required capacity.

National Has New Coupé

INDIANAPOLIS, IND., Oct. 6—The National Motor Vehicle Co., Indianapolis, Ind., is marketing a coupé body well suited for winter use and which is interchangeable with other bodies on the National chassis with either 120 or 128-inch wheelbase. This body with seating capacity for three, two in the main seat and one in an auxiliary seat at the right front, is finished in either hand-buffed leather or English whipcord, this finish extending over the roof and entire interior. The arrangement of the driver's seat leaves a baggage compartment 20 by 16 by 4 inches in the rear of it, the driver's seat being mounted 4 inches in advance of the passenger seat beside it. The interior contains the usual coupé equipment, such as electric lights, dome lights, vanity boxes, etc.

Electric Heat as Good as Steam

Vulcanizing by Any of the Modern Methods Satisfactory if Proper Temperature Is Maintained

WITH the increase in the use of portable vulcanizers the question has often come up as to whether the steam vulcanizing process is more satisfactory. M. E. Faber of the Shaler company states that the nature of the heat is not a factor as long as the proper temperature for vulcanization is observed. His views on the subject follow:

"For some inexplicable reason the average motorist's education about the care and repair of his tires has fallen far behind his knowledge of the other components of his car. As corroboration of this statement we cite the more or less general belief that steam has something to do with vulcanizing and that any vulcanizer which utilizes steam is infallible.

"To those who are not familiar with vulcanizing, as applied to the repairing of tires, it may be defined as the process of heating raw Para rubber, to which chemicals have been added, until it reaches the state in which we see it in a finished tire. This process is called curing. When the raw rubber is heated to the correct temperature and held firmly against cured rubber, the result is a union of the new and old material. So homogeneous is the weld that, if well made, it is even stronger than the adjacent rubber and cannot be separated from it. This result may be approximated by chemical means, but the actual application of heat is essential to a perfect union.

"Various chemicals are used. For example, if cheapness is desired and the manufacturer wants to make a high specific gravity rubber to sell by the pound, whiting or pipe clay are used; if toughness and a light color are desired, oxide of zinc; antimony is used for the so-called 'red inner tubes.' The latter ingredient has no effect on the quality of the rubber. It is merely used as a coloring matter.

"In making repair material practically nothing is added to the rubber except sulphur.

Must Keep Correct Temperature

"All that is really required of a vulcanizer is that it maintain the correct temperature. The heat may be supplied by any convenient means, by steam, electricity, or an open flame. The largest manufacturer of vulcanizers in this country uses all of these methods of heating and, needless to say, guarantees all of his product.

"As regards vulcanizing temperature, that may vary considerably, depending upon the ingredients in the rubber and the quantity of sulphur put into it.

"With the material which we have found to give best results in the hands of amateurs with Shaler vulcanizers a temperature of 265 degrees Fahrenheit gives the best results. This temperature has been chosen because it is considerably below that at which the tires were originally vulcanized and there is absolutely no danger of overcuring a tire if the temperature is kept at 265 degrees even though the vulcanizer is left on the tire by accident two or three times as long as our instructions specify.

"Roughly speaking, each mixture of rubber has its own vulcanizing temperature which may be almost anywhere between 250-300 degrees, although as stated above, we have found through long experience that 265 degrees gives the best results.

"Thus the usefulness of the vulcanizer depends, not upon the means of heating, but upon the maintenance of the correct vulcanizing temperature from beginning to end of the curing process. If this is accomplished by a thermostat, set to automatically vary the supply of heat as the temperature rises or falls, it relieves the operator of the necessity of constantly watching the vulcanizer and regulating it by hand. Further, it makes it impossible for the most careless operator to be unsuccessful with his repairs.

"The fallacy that steam contains some virtue not possessed by other sources of heat probably originated among garage men who often use steam to heat their vulcanizers on account of its adaptability to keeping the large surfaces at a uniform temperature. Possibly they believed that since steam did this perfectly, any vulcanizer heated by steam would be reliable. The successful use of portable vulcanizers using other means of heating as well as steam has shown this matter up clearly in a practical light."

The Engineers' Forum

Compares Automobile and Train Lighting

Electrical Engineer, Formerly Railroad Man, Brings Up Points Indicating Superiority of Electrical System

AUTOMOBILE engineers, as well as the public at large, have been deeply interested in the discussion carried on in recent issues of THE AUTOMOBILE on the subject of the advantages and disadvantages of the two great systems of automobile lighting—acetylene gas and electric. This week R. M. Newbold, an electrical engineer who was formerly in the railroad business, makes an interesting comparison of electric lighting systems used in trains and automobiles, pointing out some weaknesses of the latter as compared with the former which deserve the attention of both designers and manufacturers of these devices as suggesting possible improvements. Mr. Newbold's communication follows:

Lighting Trains and Automobiles—Newbold

CHICAGO, ILL., Editor THE AUTOMOBILE:—The writer has been noting the discussion going on between the gas and electric people in your columns and being a driver of cars since 1901 can hardly resist dipping in.

Mr. Coombs says there is the widest possible difference between house and automobile lighting, but does the public know it? I would like to ask Mr. Coombs if there is any difference between railroad car lighting and automobile lighting? Both are moving vehicles, move at variable speed and move over dusty highways and are greatly vibrated, yet electric lighting is a success on railroad cars where it is generated by a dynamo coupled to storage batteries and on long runs, such as to the coast, the apparatus is not inspected for days or weeks. If it is a success here why will it not be a success on automobiles where the dynamo is ideally located under the engine hood instead of being hung low to the ground on a dusty car truck as is done on railroad cars?

Mr. Coombs goes on to say that there is no possible comparison between storage batteries in stationary work and in automobile work—I wonder if Mr. Coombs knows that it is only usual practice to get 5 years' life out of batteries under railroad cars where they are operated in almost air-tight containers and go through all kinds of temperatures in the course of a run from terminal to terminal. Therefore why should we not get very long life out of automobile batteries?

He goes on to say that a car without a magneto should be viewed with suspicion; but I have yet to drive a magneto on any of the cars I have owned and have done heavy touring, in fact, being now on a tour of some 3,000 miles and since 1901 I have never been towed in, although in the old steamer days I came close to it several times. The heaviest of this touring was done with a car rated as of the highest grade, but without a magneto.

Mr. Coombs talks of cars having had to run with their electric lights burning on the Indiana-Pacific tour, saying that this had to be done. Perhaps they had to do so, but if they had been operating systems designed properly this would never have been required as the systems would have automatically handled this condition.

This whole discussion takes me back to the early days of railroad train lighting as I was in the railroad business up to a few years ago. When electric lighting was being introduced on railroad cars the manufacturers of gas car-lighting apparatus consumed reams of paper and pages of advertising saying just the things Mr. Coombs is now saying detrimental to electric lighting and did it stop the demand of the public for electric lights? I should say not, and the strongest reply to the question is to ask Mr. Coombs what he would say if he were forced to ride in a gas-lighted railroad car from Indianapolis to New York? If Mr. Coombs stopped at a hotel and after being assigned a room, found it was gas lighted, would he stay or pay out? I am sure he would pay out.

Getting back to my own experience I have driven coal, oil, gas and electricity as evolution has gone on, and the only thing that would force me back to gas would be absolute inability to get electricity and I don't think Mr. Coombs can ever do anything to stem the tide as the preponderance of evidence is against him.—R. M. NEWBOLD, electrical engineer, Adams & Westlake Co.

Fitting the Car to the Driver—Duryea

SAGINAW, MICH.—Editor THE AUTOMOBILE:—Your remarks in the Engineering Digest on the fitting of the car to the driver appeal to the writer, who loves comfort when on the road.

Sitting in one seat for a number of hours becomes tiresome, and I have frequently in times past changed to the other side for the sake of getting a rest. To do this requires a car that can be driven much as a horse can be driven, namely, from either side and by either hand; but it is a relief that can only be appreciated by those who have used it. It is also true that a cramped or stretched position in order to reach any part that is likely to be operated, is fatiguing, and on this account some cars are provided with adjustable pedals. In a few instances provision has been made to adjust the steering column so the wheel could be low or high, as suited the driver. Probably no one has had more experience along this line than the writer, who built for years a vehicle that could be driven from either side and by a single hand, and whose vehicles to-day may be driven from either side but by opposite hands. Our present arrangements permits one's hands being high or low, as desired, the lever simply swinging up or down. Both hands or either hand may be used to steer, throttle and adjust the spark. Further, the pedals are adjustable for height, so that the most agreeable position can be found within some little range. For extreme cases we sometimes set the seat farther back or farther forward. We believe this fitting of the vehicle to the man adds much to the pleasure of driving, and know that it certainly lessens fatigue.—CHARLES E. DURYEA, Duryea Motor Co.

Paige Detroit

Model 36
L-head motor
4-inch bore
5-inch stroke
251.2 P. D.
4 body types
$1,275

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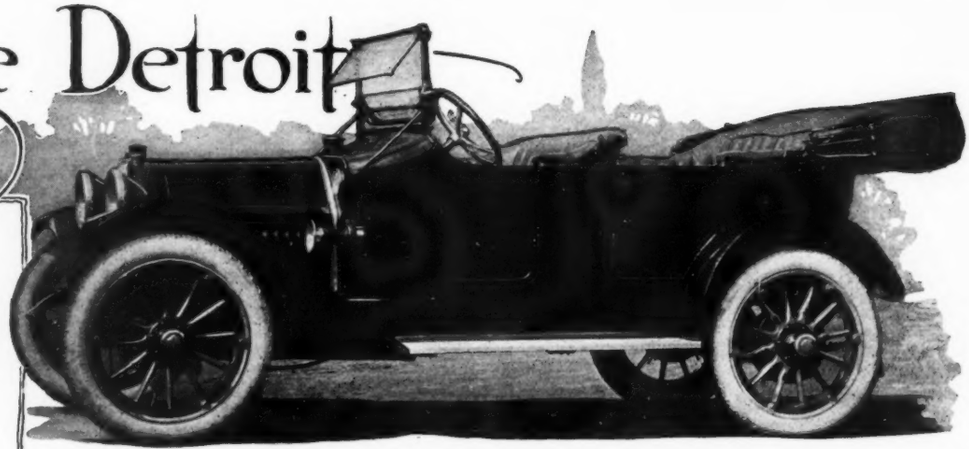
Model 25
L-head motor
3.75-inch bore
4-inch stroke
176.7 P. D.
2 body types
$975



Side view of Paige 36 five-passenger touring car for 1914, fully equipped and fitted with Gray & Davis electrical system. Like all the new Paige bodies, this type is unusually roomy, well-designed, equipped and finished for vehicles in the medium-priced car field. The chassis upon which this body is mounted has a four-cylinder, L-head block motor with a bore of 4 inches and a stroke of 5 inches. The camshaft, magneto shaft and generator are driven by silent chains

Models 25 and 36 Continued for 1914, the Price of the Latter Reduced $50—Practically No Mechanical Changes—Four Body Types for 36 and Two for 25

CONTINUING its policy of concentration, the Paige-Detroit Motor Car Co. will build the same two models of chassis for 1914 as it marketed this year. These are models 36, the leader of the line, and model 25, both of which are well known in the passenger car field. They are equipped with four-cylinder motors of the block-cast type, the power plants as well as all other parts of the chassis showing little or no change mechanically.

While the larger model 36 is still listed at $1,275 with electric cranking and lighting, the smaller model was reduced in price on September 20 from $950 plus $75 for cranking and lighting by electricity to $975 complete including these electrical features. That is, the actual reduction is $50.

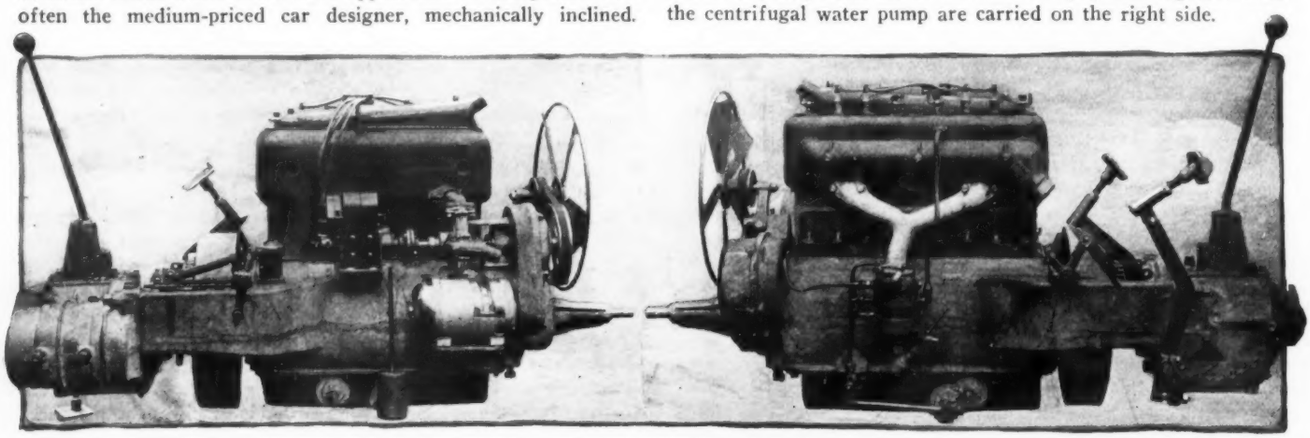
Four body types are offered in the model 36, a five-passenger touring car, roadster, coupé and sedan, while the 25 appears in touring car and roadster designs. All of these bodies are unusually roomy, well designed and equipped and admirably finished for vehicles in the medium-price field. Due credit must be given the Paige designers for the production of machines about which there is no appearance of cheapness. Too often the medium-priced car designer, mechanically inclined, produces a chassis which is unassailable but neglects to incorporate in his body designs many of the little features which, though adding scarcely anything to the cost, lend greatly to the appearance and salability of the product. There is an air of finish and proper fitting together of all parts of the Paige cars which is commendable.

Both mechanically and in general outward appearance the two Paige models differ radically. Hence to avoid confusion, they will be dealt with separately.

Paige Model 36

The model 36 motor is of the L-head type, with the gearset bolted to integral arms of the crankcase which pass around the uninclosed flywheel in yoke fashion. This construction makes a unit power plant arrangement, both front and rear of the engine unit being supported on frame cross members.

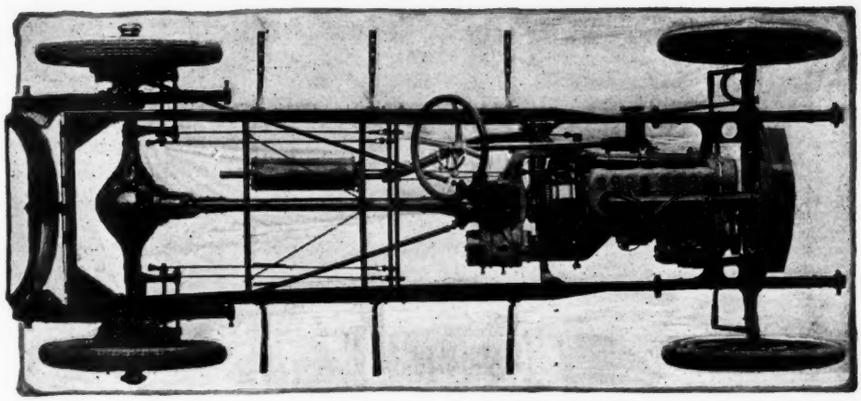
The cylinders, which are block cast, have a diameter of 4 inches and a stroke of 5 inches. This gives a stroke-bore ratio of 1.25 and a piston displacement of 251.2 cubic inches. Valves are on the left, while all of the electric equipment together with the centrifugal water pump are carried on the right side.



Left—Right side of the Paige 36 motor showing the mounting of the cranking motor and generator. Right—Left side of Paige 36 engine showing carbureter mounting intake and exhaust manifold and access to valve stems

The cylinders are cast of gray iron and the waterjacket spaces are of ample design. The cylinder assembly is fastened to the aluminum crankcase by seven .5 inch studs. The intake and exhaust ports are made very large and with straight passages, which gives the vapor easy access to the cylinders and prevents back pressure in the exhaust. As an accessibility feature, special attention has been given to the shaping of the manifolds so that they do not cover the valve tappet adjustments. The exhaust header is mounted above the intake and both are bolted to the cylinders. Very often the exhaust manifold is cast integrally with the cylinder block, but the Paige designers do not believe in this practice, they stating that the separate manifold allows more room for the waterjacket space around the valves. The intake manifold has two branches and is exceedingly short due to the location of the gasoline tank in the cowl. This is a desirable feature, for generally speaking, the shorter the passage from the carbureter to the cylinders the less chance there is for the fuel to condense in the manifold. The short manifold also raises the carbureter above the top of the frame and gives it a very accessible location.

The crankshaft, which is a drop-forging of .35 to .40 carbon open hearth steel, has three main bearings and an integral flange at the rear to which a 16-inch flywheel bolts. End thrust is provided against by two large flanges of 7-8 inch face at either end of the rear bearing. The camshaft is also a drop forging, carrying in addition to the cams an eccentric to operate the plunger oil pump. The shaft has large bearings and its diameter is 1 inch.



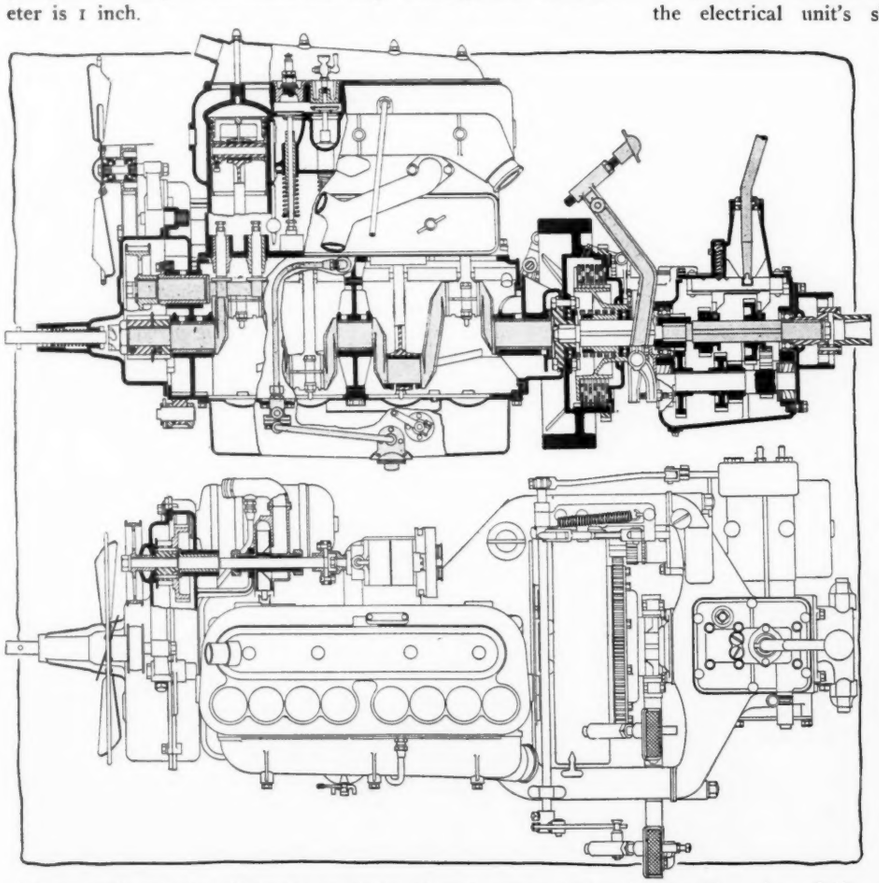
Plan view of Paige 36 chassis showing provision for carrying spare tire at the rear

The connecting-rods are made of the same steel as the crankshaft and are of the conventional I-beam section. They measure 10.5 inches in length. The upper end of the rod is fitted with a bronze bushing which works on a hardened and ground wristpin fixed to the piston by a set screw in one of the bosses.

The valves have the usual conical seats, and the heads are of cast iron, being welded to carbon steel stems. These work in long cast iron guides pressed into the cylinders. The valve mechanism is completely enclosed by removable cover plates.

A feature of this Paige power plant is the silent chain drive for the camshaft, magneto shaft and generator. On the front end of the crankshaft are two sprockets which are used in connection with Link Belt chains. One chain connects with the camshaft sprocket on the left, while the other runs to a sprocket on the right for operating the pump and magneto. For driving the generator, a third chain runs from this pump shaft down to the electrical unit's shaft. The center distances of these sprockets are: crankshaft to camshaft, 5 3-16 inches; crankshaft to pump and magneto shaft, 9 5-16 inches; magneto and pump shaft to generator shaft, 6 inches.

The lubrication system of this motor is of the combination force feed and splash type having an eccentric-operated plunger pump distributing the lubricant from an 8-quart sump in the bottom of the crankcase.

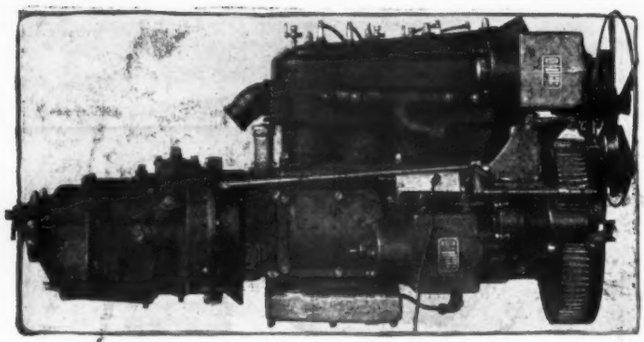


Upper—Sectional view through the Paige 36 unit power plant. Lower—Plan view of the Paige 36 power plant for 1914

Three-Unit Electric System

Considering the ignition, lighting and cranking apparatus as a whole, it may be regarded as a three-unit construction, since magneto, cranking motor and generator are separate. The ignition equipment is entirely independent of the other two units, the Bosch magneto being mounted on a bracket on the right side of the engine.

The generator, the chain drive of which has already been mentioned, is also on the right side and forward. It is geared 3 to 1, that is, it revolves three times as fast as the crankshaft. The cranking motor, which is fastened in the right arm of the crankcase passing around the flywheel, indirectly drives a large gear affixed to the flywheel. A pinion on the armature shaft of the motor gears to a lay shaft on the opposite end of which is another pinion which slides into mesh with the flywheel gear when starting the engine.



Right side of Paige 25 engine showing installation of Disco cranking motor and generator

The gear reduction between the motor and engine is 15.23 to 1.

The lighting and starting equipment is a Gray & Davis set and in connection with it there is a Willard storage battery, type HS LB68. The generator furnishes the current for the lights and charges the storage battery. This unit in turn gives out its energy for operating the cranking motor and for lighting purposes when the generator is not running at night.

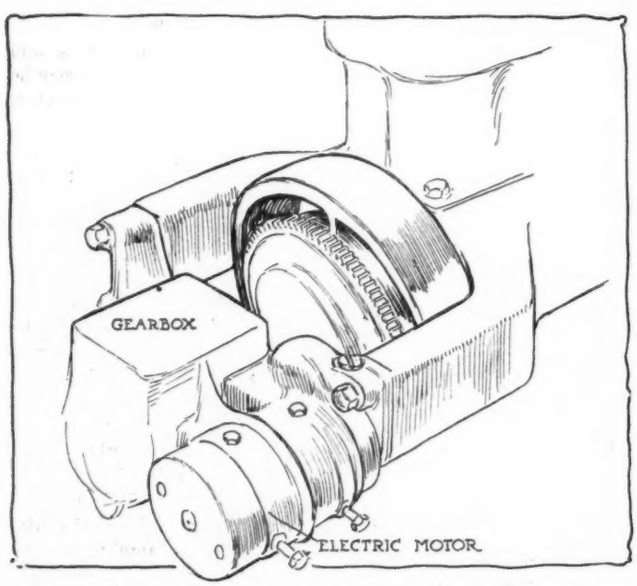
The cranking motor is provided with an overrunning clutch which prevents the gasoline engine from driving the motor when the former starts up. The motor weighs about 40 pounds. Both this unit and the generator operate at 6 volts.

The clutch is of multiple-disk type running in oil, and is composed of seven stamped driving disks, 9.5 inches in diameter, each disk having 36 perforations into which cork inserts are forced, and seven tempered saw steel driven disks driving a spider which is connected with the gearset. The driving disks are connected by tongues to the flywheel.

The gearset which, along with the clutch, is in unit with the motor, is of the selective type with three forward speeds. The main shaft is 1.25-inch square and carried on annular ball bearings, while the countershaft is 1.25-inch in diameter and carried on Hyatt roller-bearings. The gears have a 7/8-inch face.

From the motor unit, the power is carried back to the rear axle by a propeller shaft inclosed in a torsion tube. The rear unit of this car, consisting of propeller shaft, rear axle, rear springs, brakes and rear wheels, is assembled and then placed in the chassis.

The rear axle is three-quarter floating with the conventional type of bevel driving gears and differential. Radius rods with ball ends run from the ends of the axle to the rear end of the gear case and take the driving strain from the springs. The single universal joint is located at the forward end of the driveshaft and is fully inclosed.

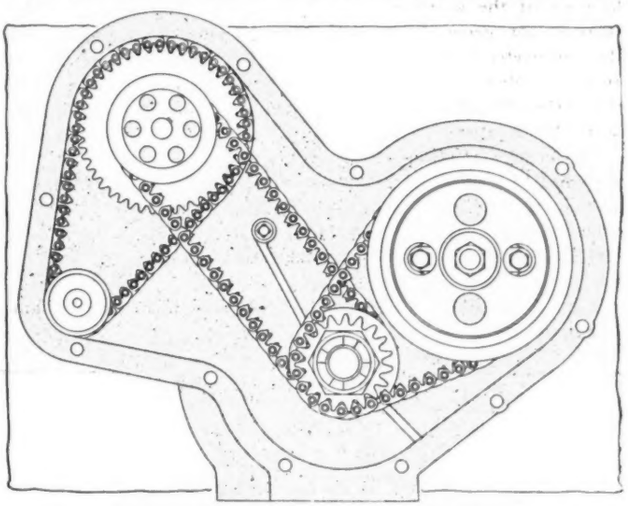


Mounting of the starting motor on Paige 36

The brakes are of the ordinary external contracting and internal expanding variety and afford a large braking surface, due to a drum diameter of 14 inches and width of 2 inches. The rear wheels are rigidly attached to the drums and carry 34 by 4-inch tires on demountable rims.

The spring suspension of the model 36 is by means of semi-elliptic front springs and elliptic rear springs. The latter are underslung from the rear axle in accordance with a rapidly-growing tendency among American cars. It allows the chassis to be hung lower without affecting the road clearance. These rear springs have scroll rear ends. The front pair are 36 inches long, while the rear measure 38 inches. The width of both sets is 2 inches.

The Paige drive is on the left with control levers in the center. Gear changes are effected by a ball-pivoted rod, the socket being in the same casting that is used for the gearbox cover. The gearshift rods and forks and change-speed lever are all assembled with the gearbox lid, making a very compact unit construction.



Silent chain drive used on Paige 36 motor

Both the open bodies fitted to the model 36 chassis have very wide doors, the front being 19 inches and the rear 21 inches in width. The front doors are hinged in the rear and are provided with an adjustable latch, by means of which they may be held open slightly to allow ventilation of the front compartment. Behind the gasoline tank, which is under the cowl, is a dash board on which the various switches and indicators are conveniently placed, with the most important on the drive side. All model 36 cars have a wheelbase of 116 inches.

Paige Model 25

Like the model 36, the 25 has a unit constructed power plant, although the design of this smaller motor is radically different from its larger brother. With a bore of 3.75 inches and a stroke of 4 inches the motor develops normally about 25 horsepower. The cylinders are of the L-head type, block cast. A unique feature of this power plant is the placing of the flywheel at the forward end, uninclosed. The inlet and exhaust manifolds on the left side are cast integrally with the cylinders, there being only one external connection to the carbureter pipe and to the exhaust pipe respectively.

The crankshaft, which is drop forged and heat treated, runs on two solid die cast bearings of white bronze, the front bearing being 4 inches long and the rear 3.5. The connecting-rods are of

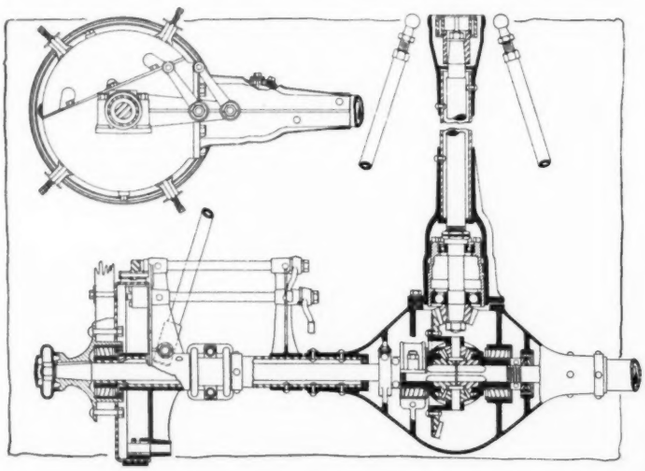
conventional type and have a length of 8.25 inches. Valves, the tappets and spring mechanisms of which are inclosed by removal cover plates, have a diameter of 1 9-16 inch.

A feature of the Paige 25 motor is the accessibility of the reciprocating parts, on either side of the crankcase, there being large removable plates for the purpose. There are two of these plates to each side, held by six bolts apiece.

The lubrication is provided for by a constant level splash system with a plunger pump supplying the splash troughs and bearings from a four-quart reservoir at the bottom of the motor. This pump is operated by an eccentric on the camshaft. Unlike the larger motor, the model 25 engine is cooled by thermo-syphon, in connection with a large radiator and water connections.

Ignition System Is Separate

The ignition is provided by a Bosch magneto located on the left side of the motor back of the carbureter, and driven by inclosed gearing from the camshaft. This ignition system is entirely separate from the electric cranking and lighting system which is of the Disco make. The generator and cranking motor are separate units and are mounted at the front of the engine on the left side, this position of the electric motor being necessary so that its gearing can mesh with teeth cut in the outer rim of the flywheel. The generator is mounted on a bracket above the electric motor and is driven by the same belt which drives the cooling fan, an idler pulley being used to adjust the belt tension. This electric system, like the other types, operates in connection with a storage battery, the generator charging this battery, which later gives out its current for driving the cranking motor and for lighting the lights when the engine is not running at night.

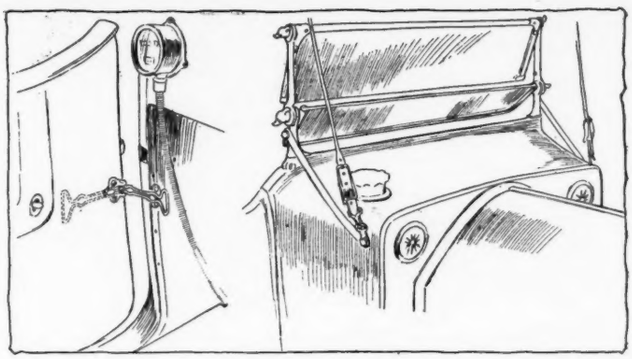


Sectional view through rear axle showing details of differential together with detail of brake construction on Paige 36

The Disco system operates on 12 volts and is provided with a two-point cranking motor switch for easy meshing of the gears in the manner already mentioned in connection with the larger car's cranking system.

The clutch is of the same type as that used on the larger car, and the gearset, which bolts to the rear, of the transmission case, through a flange, is of the same general construction also. The rear axle is semi-floating with a malleable steel housing, heavily ribbed, and double trussed. In this chassis also, the power is carried back to the rear axle through an inclosed driveshaft fitted with a universal joint at its forward end. The brakes operate conventionally on drums measuring 10 inches by 2 inches.

Although the front spring suspension is of the standard semi-elliptic type, the rear springing is unusual in that a single full elliptic spring, mounted cross-wise on the rear axle housing, supports the rear of the car. This spring is unusually large, having a length of 36 inches and a width of 2 inches.



Left—Clever device for permitting partial opening of the doors on the Paige to allow ventilation. Right—Cowl gas tank and cut glass side lamps with double hinged rain vision windshield and neat top strap fastening

The drive and control of this car are on the right, and, also differing from model 36, the gasoline tank on the touring car model is located under the front seat, while the roadster carries this tank at the rear of the seat, gravity feed being used.

The front springs are 24.25 inch long and have a leaf width of 1.75 inches. This method of spring construction gives the chasses a three-point suspension, which is a very desirable feature.

This model has a wheelbase of 110 inches and its equipment is complete including demountable rims with one extra.

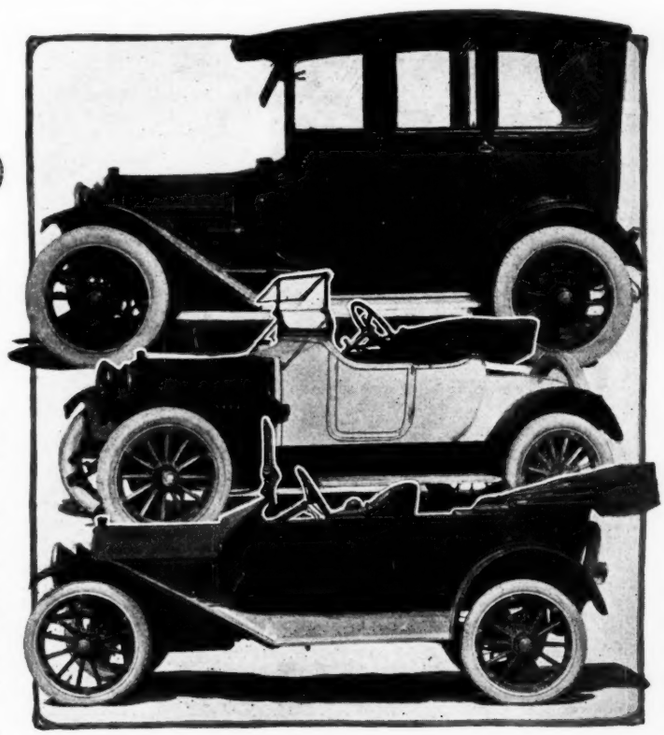
The principal motor dimensions in addition to those already given are listed:

CRANKSHAFT BEARINGS:
Front: 1¾ by 3 inches.
Center: 1¾ by 2½ inches.
Rear: 1¾ by 4 inches.

CRANKPIN BEARINGS:
1¾ by 2⅜ inches.

CAMSHAFT BEARINGS:
Front: 1½ by 3½ inches.
Center: 1¾ by 1⅞ inches.
Rear: 1½ by 1⅝ inches.

VALVES:
Diameter: 2 inches.
Lift: 5-16 inch.



Three Paige body types for 1914: Top—36 Limousine. Center—36 runabout. Bottom—Five-passenger 25 touring car

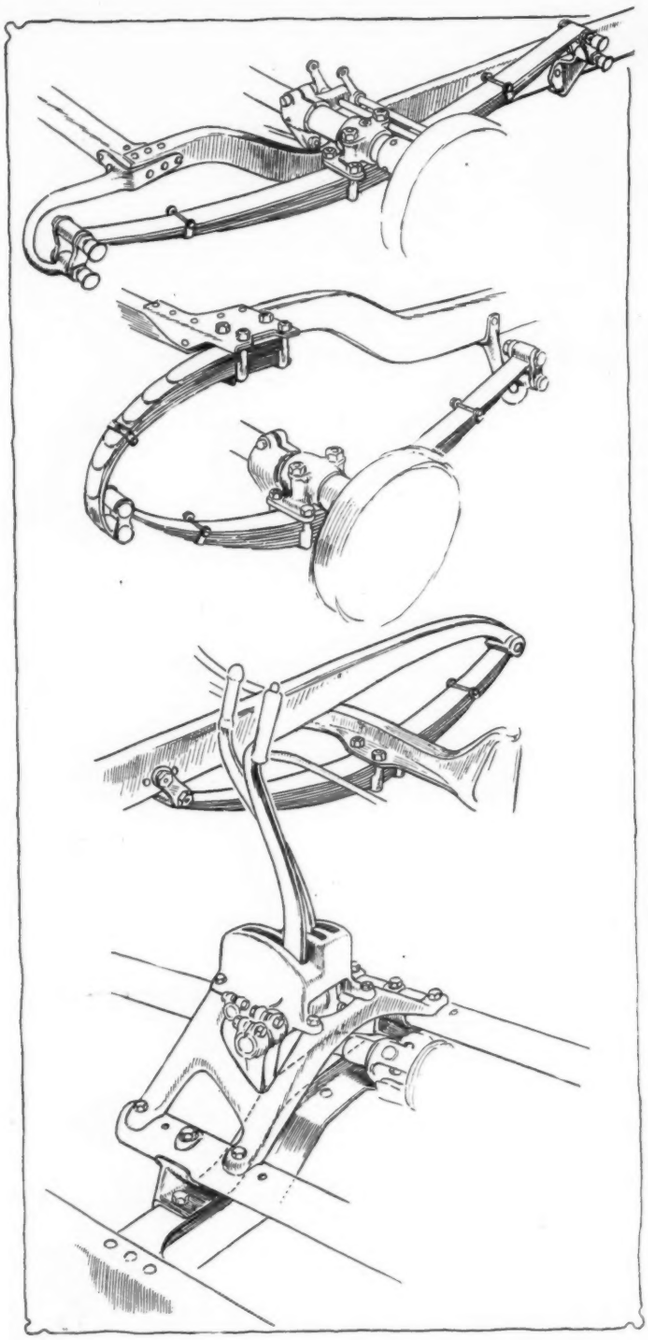


Fig. 1—Top—Rear axle and rear spring mounting of the underslung Regal model, showing the shackling of the semi-elliptic springs at both ends. Note the underslinging of the spring on the axle. This makes for a lower center of gravity and consequently a greater factor of safety in respect to overturning. The makers also claim that it greatly improves the riding qualities of the car

Fig. 2—Upper middle—Rear spring attachment of overslung Regal model which has been improved in that the spring is now mounted beneath the axle. This spring is shackled at its forward end

Fig. 3—Lower middle—showing how front springs are underslung on the Regal Model C, which has the frame over the axle. This underslinging is accomplished without materially decreasing the road clearance as compared with the overslung construction on the same chassis

Fig. 4—Bottom—Method of mounting gearshifter and emergency brake levers for center control in the underslung Regal model. This, like the other Regal model, has a rear axle gearset, which makes the mounting of these levers a separate job. They are mounted on a bridge work supported on the rear end of the tubular subframe members, this bridge work carrying them well above the propeller shaft

Regal Models Both Under- and Overslung

Four Body Types All Listed with Full Equipment—Left Steering—Rushmore Cranking and Lighting

REGAL cars are in two chassis types for 1914, one an underslung model, the other an overslung. The underslung is made for three body types, touring car, roadster, and coupé, all mounted on the same standard 108-inch wheelbase chassis. The overslung model carries a five-passenger body only and is built in 116-inch wheelbase as this year. The underslung is designated model T; the overslung model C.

The general schemes of layout in the underslung and overslung chassis are alike, although they use different sizes and designs of motors, and the chassis vary in other respects, namely, in that a sub-frame is used to carry the motor in the underslung but not in the overslung. Both use rear axle gearsets.

The general scheme of Regal improvements is found in both types. The principal changes are the shifting from right drive and control to left drive and centrally located levers; the addition of electric cranking and lighting; the underslinging of the springs all around on the overhung model; a refinement of the clutch-operating yoke on the underslung chassis; the elimination of side lamps and alterations in the body designs.

The Rushmore starting and lighting system used on both chassis types has practically the same mounting on each, the generator being carried at the left front and driven by exposed silent chain from the forward end of the magneto shaft, and the cranking motor at the right rear where its driving pinion meshes with the ring teeth on the flywheel. The Rushmore is a 6-volt system and uses a 100-ampere hour Willard battery.

Generator Carries Lights at 12 Miles Per Hour

The generator, geared 2 to 1, gives sufficient current to carry the car lights at a speed of 12 miles per hour on direct drive, and at higher speeds the surplus current goes to battery charging. As there are no side lights on the body, the switch takes care of dimming the headlights for city driving. The switch box and junction box are located on the dash and form a terminal for all generator wires.

The cranking motor, geared 8 to 1 to the flywheel in the underslung, is sufficiently powerful to spin the gasoline motor 90 to 125 r.p.m. with a fully charged battery. In the overslung model the reduction is 5/6 to 1. There are no intermediate reduction gears between the starting motor and the flywheel, the pinion on the armature shaft meshing directly with the flywheel teeth. For the control of the starting motor there is a two-point switch. When the starting switch is closed by pressing on the pedal for the purpose, a small current passes into the motor and starts the pinion revolving slowly and at the same time draws it into easy engagement with the flywheel gear. As the switch is pressed still further into contact, the full strength of the current comes direct from the battery to the motor. At the first explosion, the engine crankshaft rotates faster than the electric motor and the pinion is automatically thrown out of mesh with the flywheel gear.

The bodies of these new Regals are brought up to the latest demands of the motoring public in that the flush-side effect has been carried out. The cowls slope into the bodies proper and the dashes have been altered and improved to suit. The running boards are clear. The doors fit snugly to the body outline, none of the hinges or handles being in view. Fenders are rounded at the rear to follow the line of the wheels. A new type of tire carrier is fitted at the rear.

For 1914, the Regal Motor Car Co. is listing all of its models with full equipment, the custom in the past being to list the equipment extra. Besides the electrical apparatus, the fittings include mohair top, rain vision, ventilating windshield, speedometer, curtains, tire irons, demountable rims, electric horn attached to the motor and complete tool equipment. The prices this season were $950 for the underslung touring, $900 for the roadster and $1,250 for the underslung coupé and overhung model C touring car.

The equipment of all of these was extra. The new series Regals are listed $1,125 for underslung roadster and touring car, $1,600 for the underslung coupé and $1,350 for the overhung model C. These 1914 prices include complete equipment ready for the road as already enumerated.

The motor for the underslung is a four-cylinder, L-head, block type, with 3.75-inch bore and 4-inch stroke, having a horsepower rating of 22.5. The company rates it at from 25 to 28. This motor is a symmetrical design with the Michigan magneto and generator mounted at the left front, thereby leaving all of the valve springs accessible.

Two Crankshaft Bearings

The barrel type crankcase carries two crankshaft bearings mounted in its ends. The bottom of this case is removable, and forms the oil reservoir. To remove the crankshaft after the timing-gear has been removed, the front bearing housing may then be taken off and the shaft slipped through the opening thus made in the front of the crankcase. The camshaft has two bearings and has integral cams and pump eccentric. There are four points of support by integral crankcase arms, these resting upon a sub-frame consisting of two tubular bars running lengthwise and parallel to the main frame rails. These supports are carried at either end upon frame cross members, one amidships and the other back of the radiator.

Inlet and exhaust manifolds are removable. The exhaust manifold is placed on the valve side, the carbureter located on the opposite side, with the intake on this side also, the passages to the cylinders being within the casting, passing through the waterjacket space to the valve side. This has the advantage of aiding the vaporization of the fuel in the jacket spaces with consequent better combustion. The carbureter is a Schebler.

Due to the thermo-syphon system the water inlet and exhaust pipes are of large size. The inlet pipe has two connections to the waterjacket space, while the outlet which extends along the entire top of the cylinder block splits into two branches which

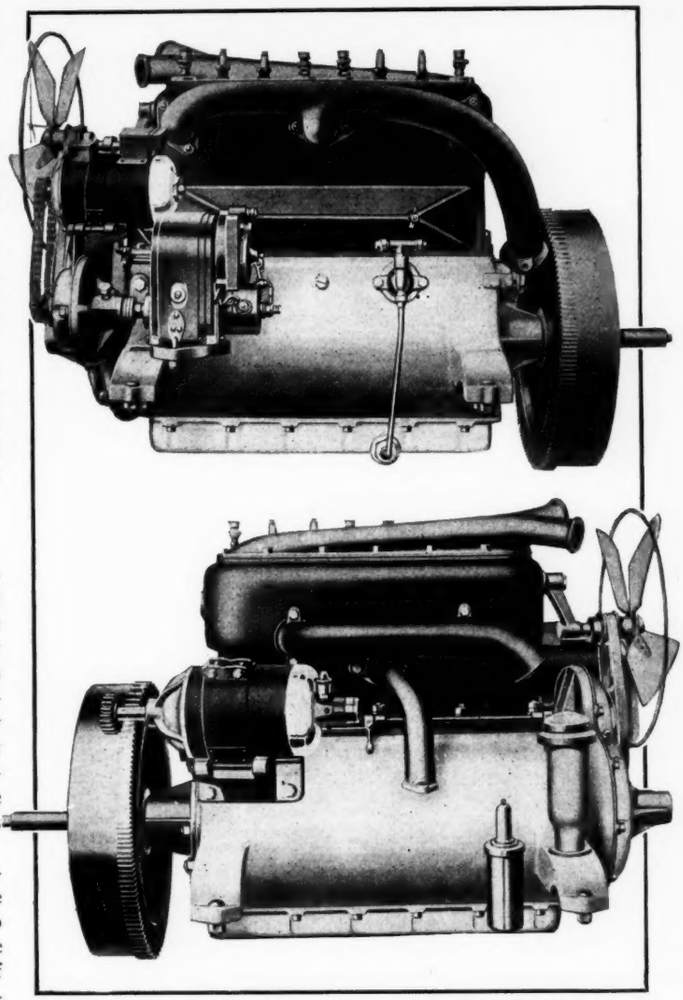


Fig. 5—Upper—Valve side of motor used in the underslung Regal, showing Rushmore generator and Michigan magneto mounted well to the front, thereby leaving valve springs accessible

Fig. 6—Lower—Non-valve side of underslung motor showing Rushmore cranking motor with gearing, also large diameter intake and return water pipes

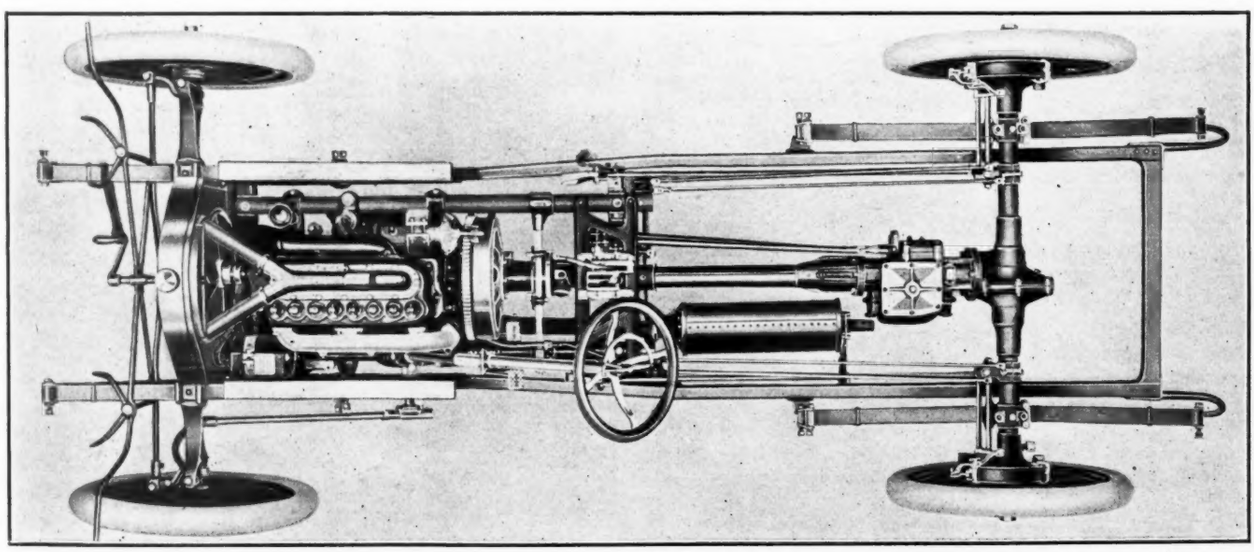


Fig. 7—Chassis of underslung Regal model, showing tubular sub-frame members for supporting the motor and bridge work for central control levers. The steering wheel is mounted on the left side for the first time as in the oversiung chassis. On both underslung and oversiung chassis the gearbox forms a unit with the rear axle

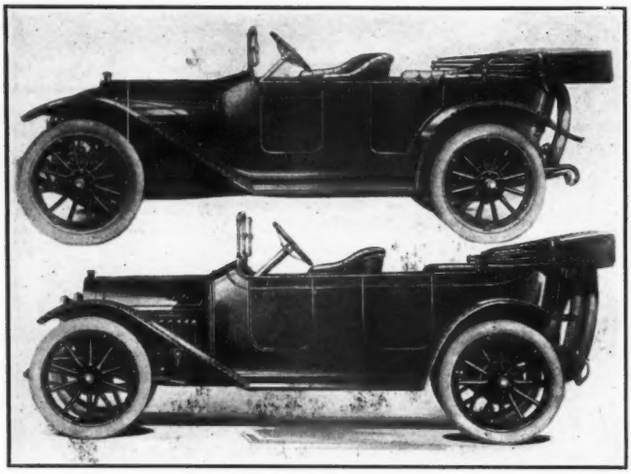


Fig. 8—Underslung Regal touring car with 108-inch wheelbase. On this wheelbase are also mounted roadster and coupé bodies. In the lower illustration is the overslung Regal with the one body fitted to this chassis, namely, a five-passenger touring type

run into the top of the radiator, forming a Y-shaped connection.

The spiral timing gears are inclosed in the usual way at the forward end. The large camshaft gear is made of gray iron while the crankshaft gear and magneto shaft gear are steel. This steel runs against iron which insures quiet running.

Valve tappets and springs are all completely inclosed. The I-beam connecting-rods have four-bolted lower ends. The pistons are of gray iron and equipped with three eccentric, diagonally-split rings each.

Overslung Model Has More Power

The motor in the overslung model is somewhat higher in power, although in general appearance it is much the same as the other. It produces about 35 horsepower normally. It is of the L-head, block type with four cylinders. The crankcase is split into halves, the upper half carrying the three-bearing crankshaft and the camshaft, which also has three bearings. The cylinder dimensions are 4 by 5 inches and the same general casting design as that of the smaller motor is used, differing only in the integral casting of the exhaust manifold with the cylinder block on the left side and the single inlet water connection at the front of the motor. The motor is supported from the main frame direct in contrast with the subframe construction used in the underslung model.

Leather-Faced Cone Clutches Used

The Regal models have cone clutches of the same construction although that of the model C is slightly larger than model T carries. The mean diameter of the former is 14 inches, while the latter has 13 11-22 inches for this dimension. These clutches are leather faced.

There is a slight change in the clutch mechanism of the model T in that the clutch-shifting yoke has been provided with a ball bearing and the clutch disengaging mechanism has been changed from a plain bronze bearing to the annular ball type and consists of two bearings which are carried on the ends of two levers keyed to the pedal shaft.

In changing the control to the center the underslung car has been provided with a bridge construction carried on the rear ends of the tubular motor subframe rails. This bridge is arched in the center and due to this form brings the gearshaft quadrant and the emergency brake ratchet up high enough to come within the floor level.

In the model C construction, the quadrant and levers are supported on a cross frame member in the usual way.

The rear systems of both models are identical in design and consist of the gearset, inclosed propeller shaft and rear axle in unit. The forward end of the propeller shaft is provided with a universal joint, the torsion tube commencing just back of this and extending back to the forward flange of the gearbox to which it bolts rigidly.

The gearset on these cars is of very compact design and provides three forward speeds. It is a Covert design and both the mainshaft and the countershaft are carried on Hyatt spiral roller bearings.

The rear axle is three-quarter floating with the load carried on the housing. The axle shafts of the model T are 1.25 inch in diameter, while on the model C they have a diameter 1-8 inch larger.

Characteristic Underslung Features

The springing of the underslung model is well-known and consists essentially of the running of the frame below the axles, it being suspended from them by the springs. The long rear half-elliptics also extend under the axle, shackling at their front ends to the frame and at the rear to spring horns. The front springs rest upon the axle at their centers, shackling to the frame at the ends. The rear springs in this model are 52 inches in length. The principle involved in this underslung construction is in the bringing of the center of gravity of the entire car lower, with consequent greater factor of safety as regards turning over. This underslinging of the frame is done without materially decreasing the road clearance as compared with the same chassis overhung.

The model C springing has been changed on the new models in that both front and rear springs are hung below the axles, attaching to them in the usual way, however. This allows the frame to be lowered also by several inches, and such construction is rapidly gaining ground, many of the new cars being so suspended. Road clearance is unaffected by this change.

The crankshaft bearing dimensions are given:

MODEL T.

Front: Diameter (inside), 1.878 inch; length, 3 13/16 inches.
Rear: Diameter (inside), 1,869 inch; length, 3 5/16 inches.

MODEL C.

Front: Diameter (inside), 1.743 inch; length, 2 35/64 inches.
Center: Diameter (inside), 1.743 inch; length, 2.875 inches.
Rear: Diameter (inside), 1.743 inch; length, 3 3/16 inches.

CONNECTING-ROD LOWER BEARINGS.

Model T: 2 inches diameter; 1.877 inch length.
Model C: 1.615 inch diameter; 2 inches length.

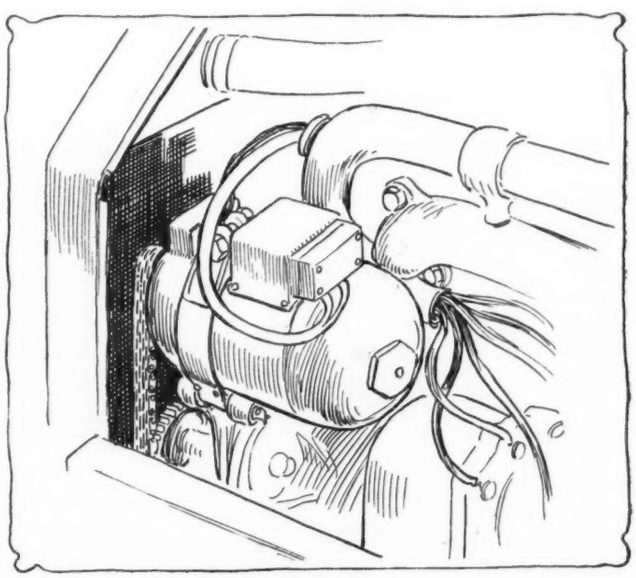
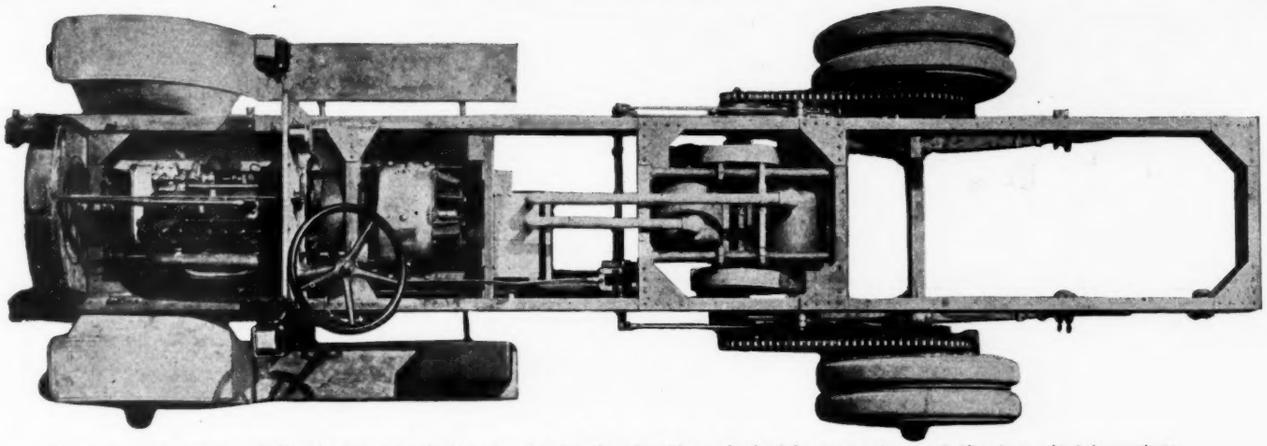


Fig. 9—Showing the mounting of Michigan magneto and Rushmore generator, together with the methods of conduits for the wiring of both



Plan view of chassis of the Hexter gas-electric truck, showing location of electric generator and the two electric motors

Hexter Brings Out Gas-Electric Truck

Power Plant Consists of Gasoline Motor, Generator Under Driver's Seat and Two Electric Motors

WITH the evident object of bringing out a truck which will be as simple from the driver's end as possible, P. K. Hexter, New York City, has put on the market a vehicle driven by an unusual combination of electric and gasoline units as shown in the illustrations.

There are three power units making up the plant for this new vehicle which consists of a gasoline motor located in the usual manner under a bonnet; an electric generator located beneath the driver's seat and two electric motors located one behind and the other in front of the jackshaft. There is no connection between the gasoline motor and the wheels except by way of the electric generator and the electric motors. The electric generator is directly connected to the end of the crankshaft of the gasoline motor. The gasoline motor cannot turn over without revolving the armature of the generator.

The generator is so wound that it speeds at about 300 revolutions per minute and throughout the idling range of the gasoline motor the amperage is practically nothing and the voltage about 2. The current generated at this time is not sufficient to move the truck and with the controls arranged to drive the truck the engine can be turning at this speed without the truck moving. When the gas engine is speeded up, however, the current immediately increases above 300 revolutions and becomes high enough to drive the wheels. At 12 miles an hour or medium speeds the efficiency of the drive between the flywheel and chain sprockets is about 81 per cent.

Left Steer and Control Used

The vehicle has left-steer and control and is chain driven. A foot accelerator controls the gasoline motor; the spark is fixed and there is no clutch, making the steering column, wheel and cab-floor noteworthy for the absence of control levers and pedals.

The vehicle is directly controlled by an electric controller which gives two speeds forward. There is but one pedal, for the brake, and one lever for the emergency brake. It is possible to leave the truck standing with the electric controller set for full speed ahead and the vehicle will not move, for, although the gas motor is turning over the generator, it is not developing enough electrical energy to move the driving wheels. When the gasoline motor is making 300 revolutions or more per minute the truck will move. By pressing down on the accelerator the truck will move forward but will not jerk, so gradually is the power developed by the electrical generator.

The maximum speed of the vehicle is 12 miles per hour.

It has an overall length of 240 inches and may be turned in a circle with a diameter of 44 feet. It has a wheelbase of 13 feet, a front tread of 62 inches and a rear tread of 65 inches.

In length the loading platform measures 144 inches and in width 54 inches. The front of the loading platform is 8 feet from the front of the truck. The height of the loading platform from the ground when the truck is not loaded is 36 inches, this distance decreasing to 34 inches when a capacity load is carried.

When empty the truck weighs 8,000 pounds, of which 3,450 pounds is borne by the front and 4,550 pounds by the rear axle and wheels. Of the total weight of vehicle and load 5,600 pounds is carried on the front, and 10,400 pounds on the rear axle and wheels. The percentage of total load on the front wheels is, therefore, 35 per cent. and on the rear wheels 65 per cent. The distribution of useful load is 27 per cent. front and 73 per cent. rear.

The gasoline motor has a bore of 4.5 and a stroke of 6.75 inches. The cylinders are cast in pairs with the valves enclosed. The Eisemann automatic advance magneto is used and the G. & A. carbureter, neither of them needing adjustment. Lubrication is by pressure. A governor is fitted to prevent the racing of the motor.

On a sub-frame immediately behind the motor is the generator which is compound wound of the continuous-current type with capacity of 7½ kilowatts, 60 amperes and 125 volts.

Each Motor Drives a Sprocket

Each of the two electric motors drives one sprocket. Each has a capacity of 26 amperes and 85 volts and a speed of 1,200 revolutions per minute. There is no differential. Drive is by inclosed chains to the jackshaft.

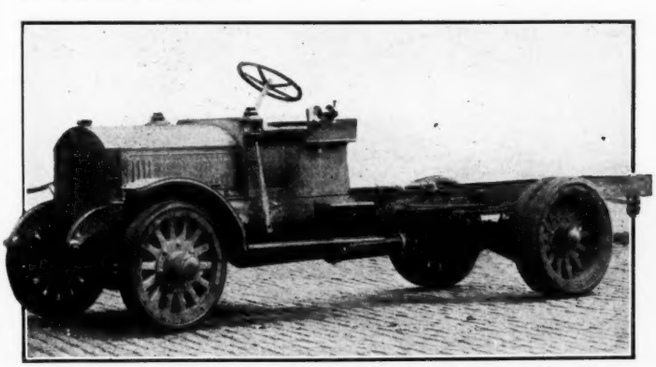
The controller is of the simple rotating type and all leads and terminals are plainly marked so that all connections may be easily made if they have been broken.

Two brakes are provided, both located on the rear wheels. The brake drums are 18 inches in diameter. The external contracting brake is operated by the pedal and the internal expanding brake by the lever.

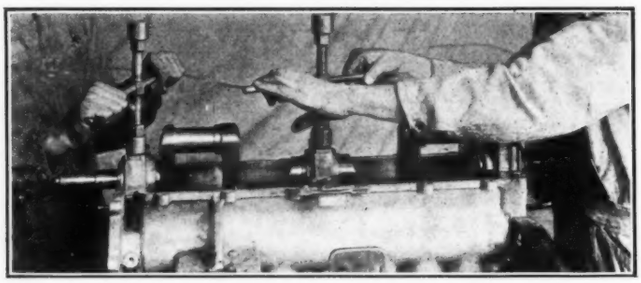
The front springs, which are nearly flat, are 46 inches long and the rear springs are underslung; they are 54 inches in length.

The frame is channel steel with 7-inch side members and is fitted with six cross members.

Front tires are 37 by 5 inches, single solid. Rear tires are 41 by 5 inch dual solids.



Three-quarter view of the new Hexter gas-electric truck chassis



The Rostrum

Wants a Small Four-Cylinder Car for $2,000

EDITOR THE AUTOMOBILE:—For the past few years I have been anxiously watching for a type of car which would find an immense sale, but which for some reason the manufacturers will not give us. I refer to a really first-class small four of about the following specifications:

Wheelbase, 115 inches. Actual weight on the road, fully equipped, 2,600 pounds. Price, $2,000.

Motor 3.75 by 4.75, preferably T-head, but L-head could be tolerated. Gearbox, four speeds and reverse, direct on fourth, annular bearings, chrome-nickel gears; position of gearbox amidships, taking care to insure accessibility by keeping ahead of the front set. Frame and axles heat-treated alloy steels. Wheel and axle bearings, Timkin and annular. Springs, 2.25 or 2.5 inch vanadium. Foot brake with heavily-anchored metallic shoes to act on gearbox; hand brake to act on wheel drums not less than 16 inches in diameter, the drums being properly bolted to the spokes. Tires, 34 by 4, rough treads. Shock-absorbers. Cellular radiator of plain shape, with no freakish curves; plain hood, free from vents; scuttle dash and rather low, straight-line, two, four or five-passenger body—the entire job to be a thoroughly well-designed, handsomely-finished little car, using the very best of everything throughout.

There are plenty of cars resembling this on the other side (though with motors of somewhat smaller bore). But they are sold even there at higher prices, and when imported to this country are very much more expensive, and, of course, have the additional disadvantage of being made of parts with metric dimensions and difficult of replacement. American cars of this type are lacking. There are plenty of about the size mentioned, but they are all of the cheap and nasty variety; characterized by poor finish, uncomfortable riding, the early development of a tinny rattle, and frequently by positive mechanical defects due to the effort to get the cost down to the lowest possible figure. These cars are often capable of rendering a very fair amount of service and are, no doubt, reasonable value for the price of from $750 to $1,000 asked for them, and I am not for a moment objecting to them. What I do object to is that the man who is prepared to pay about $2,000 is obliged to accept for his money 1,000 pounds more car than he wants, an engine with an insatiable thirst giving him 10 horsepower more than he needs, a gearbox with one speed less than he must have for efficient travel in our land of bad, poorly graded, roads, and brakes that he is always a little uneasy about when he gets into mountainous country.

Why are the manufacturers doing this? Is it not because sales must be stimulated by some yearly novelty? In recent years we have had successively fore-door bodies, then gas and compressed-air self-starters, then electric self-starters, and now it is medium-priced sixes. Each in turn has met with fair response on the part of the buying public; but every one of these changes has tended toward more weight and higher upkeep, and buyers are beginning to consider very carefully what it will cost them to run these big 135-inch-wheelbase cars, weighing over 4,000 pounds, with their 4.5 and 5-inch tires. A few minutes spent in deliberate observation along the motor row of one of our large cities will convince anyone that these cars are being moved only by salesmanship of a high order.

In the face of this condition it is indeed surprising that not a single American manufacturer has ever yet tried a light car of the type outlined above. The greatest novelty he could today offer would be a marked lowering of upkeep and depreciation, connected with the dainty beauty of a perfectly designed and executed small car. The first firm of established reputation to give us this will need few salesmen, the only difficulty will be to deliver fast enough.

Wallingford, Pa. CASPAR W. MILLER.

White Flag at Turnpike Crossing Deceives Uninformed Automobilists

Editor THE AUTOMOBILE:—At Berlin, Conn., there is a turnpike crossing which should be drawn to the attention of every tourist. It is illustrated in Fig. 2. The electric car is shown approaching from the east. The flagman uses a white flag. This train could not be seen when passing southward. The uninitiated, mistaking the white flag for a clear signal, would proceed into great danger.

Berlin, Conn. M. MULLEN.

Magneto Cannot Charge Storage Battery Because of Alternating Current

Editor THE AUTOMOBILE:—Do you know of any device by which the current, or part of it, could be sent from a Ford magneto to a storage battery in the same manner as it is delivered from a generator to a battery?

I am thinking of buying a storage battery for lighting only, and would like to know what would be the most suitable size, and about what candlepower lamps would be satisfactory. With satisfactory lights (two headlights), how long should a

medium-sized storage battery last without its being recharged?

Cavett, O. L. M. WADSWORTH.

—The Ford magneto, or, in fact, any other type of magneto, cannot be used to charge a storage battery. The magneto is an alternating current machine and therefore it is impossible to use it as an instrument for charging a battery unless a rectifier is used to convert the alternating current to a direct current before it is led to the battery. You can use a storage battery in connection with your Ford magneto for lighting if you will follow the two suggested schemes which are illustrated in Figs. 3 and 5.

By means of this system the magneto current is used as a source of supply for the electric headlights while running and if the headlights are desired and the car is stationary and the motor is not running, the battery can be used.

The best lamps for you to buy for your lighting system would be of the 6-volt type. They are most easily handled by means of a battery, the carbon filaments are toughest and more rugged in this style of lamp and it is easiest to renew at out-of-the-way places, because of general use.

Regarding the length of time the headlights will burn on a medium-sized battery, this can be exactly figured out if the candlepower of the lights is known and the ampere-hour capacity of the battery is known. If the candlepower of a lamp is divided by the voltage of the system the result will be the amperes drawn by the lamp. For example, take a 21-candlepower bulb operating at 6-volts, the amperes required to burn the lamp will be 3.5. If you use 18-candlepower lamps on your car each will require 3 amperes or 6 amperes for both. If you use a 60-ampere hour battery the number of hours your lamp will burn will be 60 ampere hours divided by 6 amperes or 10 hours. The normal battery gives about 104 per cent. of its rated capacity when discharged at a 10-hour discharge rate. This will give slightly more than 10 hours as a result but the latter factor may be ignored in making any simple calculations as regards the time your lamp will burn. If you desire to figure the candlepower of the lamp, however, it is always useful to know that you can do this by means of an ammeter by simply multiplying the reading on the ammeter by 6 for a 6-volt type of lamp.

Full and Three-Quarter Floating Axles

Editor THE AUTOMOBILE:—What is the difference between a floating rear axle and a three-quarter floating type?

New York, N. Y. J. W. McE.

—The axle used in the Overland is the best example of what is known as the three-quarter floating axle. In fact, this word may have been coined at the Overland factory to fit the Overland axle, which is about half-way between the semi-floating and floating type. The semi-floating axle is distinguished by the fact that the full load of the car rests upon the housing of the axle and no load is carried by the axle shafts. The axle shafts, however, are not free to be removed by simply taking off the hub cap of the rear wheel as they are connected to the wheel. In withdrawing the axle it is necessary to remove the bolts from the flange connection between the axle and the wheel.

The floating axle carries no load, all of it resting upon the housing and is absolutely free to be removed by simply taking off the hub cap of the rear wheel. The inner end of the axle shaft is squared and takes the drive through the differential and the outer end may be squared or splined to transmit the drive directly to the wheel. Since it carries no load in an axial direction there is no necessity of using a collar or any other device except to hold the axle in place. This is accomplished by the hub cap, which prevents the axle from falling out. In other words, in case of a lost hub cap with an axle of this type the axle would probably work its way out of the wheel in a very short time.

The three-quarter axle used on the Overland car is different from the floating axle in that the wheel is carried on the end of the axle shaft which is threaded and then keyed. The inner end of the axle shaft has to be anchored in order to hold the axle and wheel in place. This is done by an adjustable collar which is fitted inside the connection of the axle shaft to the differential. The axle shaft is carried on a roller bearing mounted between the housing and the shaft.

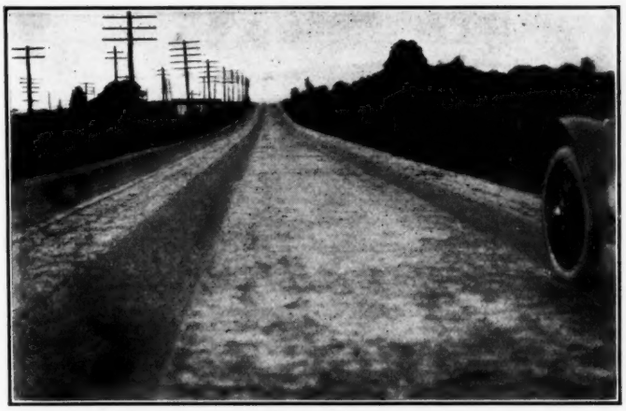


Fig. 1—Brick and tar macadam ribbon road used in Connecticut

Experiments on Connecticut Roads

Editor THE AUTOMOBILE:—The Connecticut state highway commission is constantly experimenting with all types of roads with a view to determination of what is best to meet the constantly increasing motor vehicle traffic. One of the most novel constructions in the whole state is that tried out below Walfingford on the Hartford-New Haven road. This experimental stretch is about .5 mile in length. It was built under the supervision of former Commissioner MacDonald. It is called a brick-and-tar macadam ribbon road for the reason that the course resembles a series of ribbons. It was originally intended to make the experimental stretch a mile long. The main travel path is brick, 8 feet wide. This is covered with concrete. At each side of the main or center travel path are 3 foot strips paved with tar macadam. The outer edges of the road are brick courses 3 feet wide. A concrete curb or stop is laid at each side. Inquiry at the highway department revealed that no more road of this type is likely to be built. During the past 2 years liberal use has been made of oil. Tar macadam proper has come into favor. The one objection to a brick course is that the bricks are liable to chip and break under horse travel.

Hartford, Conn. WM. JOHNSON.

Interested in Piston Valve Motor

Editor THE AUTOMOBILE:—In one of your issues of about a year ago there were sketches of a number of non-poppet valve motors, of the four-cycle type. One of these looked as though

Fig. 2—At Berlin, Conn., a white flag signifies danger

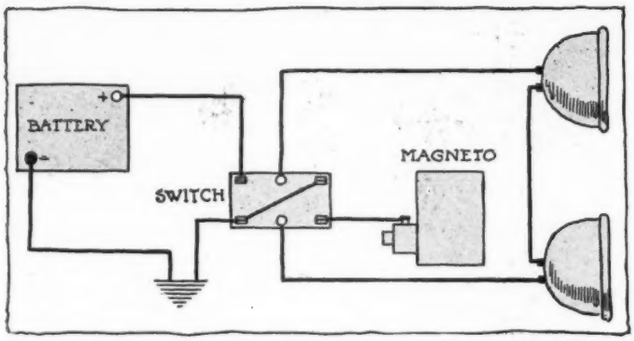


Fig. 3—Suggested wiring for Ford lighting system

it might be feasible, and that one was a piston valve motor, that is, a working cylinder with a smaller piston on either side, one to admit the fresh gas and one for the exhaust passage. I believe that several of these piston valve motors have been built, but never marketed and I would like to know why. I am advised that THE AUTOMOBILE has probably tested some of these motors and knows the defects.

San Diego, Calif. R. S. DICKINSON.

—Several motors of the piston valve type have been described in THE AUTOMOBILE from time to time and many of them meet the brief description you give. As you state, many of these motors have actually been built but the reason they have not gone further than this is that none of the inventors have been able to convince capitalists that the manufacture of these motors was a money making process. Many have fallen down in a practical way through the inability of the piston valve to withstand the high heat of the internal combustion motor without warping, sticking through inadequate lubrication, or, owing to their unbalanced design, they have put too much load on the motor. There are several types of undoubted merit which have not been marketed for the sole reason that the inventors were better at designing the gas engine than they were at marketing it. The sleeve valve motors which have been adopted both on this side and abroad by automobile companies have proven themselves satisfactory but no rigid piston design has as yet come into prominence. The Goby engine, which has from time to time attracted attention, is somewhat on the piston type, its valve consisting of the vertical cylindrical reciprocating sleeve mounted on the side of the motor.

A Ball Bearing Repair That Failed

Editor THE AUTOMOBILE:—A gentleman recently came in with a broken thrust plate of a ball bearing that he "wanted fixed that very day." I shook my head and told him that our repair could only be temporary. He said he couldn't wait for a new plate from the manufacturers so "any old way" would do. I told him that we were unable to give him the same hardness, accurate dimensions, race curvature, and finish that were in the original thrust plate. "But," I added, "I can fix you up for a few days, until you get a new plate, if you'll be careful when making turns to the right to go slowly and be as careful as possible with your car at all times. The plates we will make for you will be too soft for high speed or rough usage."

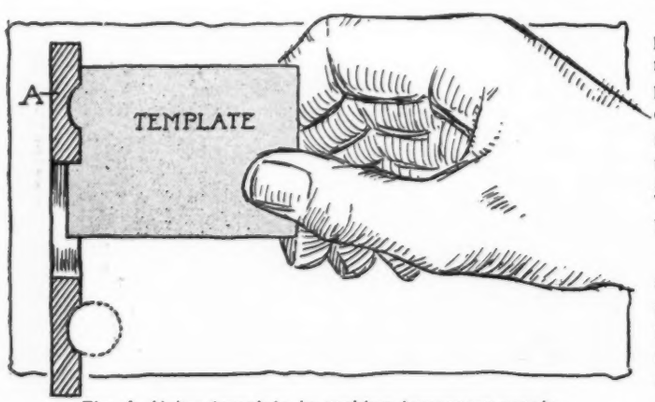


Fig. 4—Using template in making temporary repair

He approved. I found a piece of mild steel boiler plate, 3-8-inch thick, sheared off the corners, chucked it and turned the side A as flat as I could. Then I turned it around, chucked it solidly and turned down side B until the plate was of the same thickness as the original. Then I turned the race C as accurately as I could, using a template that I had carefully cut and filed out of a piece of sheet brass. The method of using the template is shown. After polishing the piece it looked just as good as the original.

About a month later the same gentleman met me on the street and acknowledged that he had been an idiot. The new plate worked so nicely that he "could see no sense" in ordering a duplicate. The plate was so difficult to reach that he did not take the precaution to examine it when it should have been examined, and, one day while rounding a curve to the right at his usual speed with a good plate, the balls, races, and all, died an untimely death. Post mortem examination showed that my temporary plate had worn unevenly just as I had feared. This no doubt caused one of the balls to catch and break and so play havoc with the rest of the balls and races. The gentleman was forced to buy an entirely new bearing at a cost considerably greater than that of the simple thrust plate.

Wouldn't it be well to always follow the advice of a machinist who is frank enough to point out the extent of his helpfulness? A hardened part is usually hardened for a purpose.

Brooklyn, N. Y. W. F. SCHARPHORST.

Sixty R. P. M. Enough to Start

Editor THE AUTOMOBILE:—Will you allow me to again mix in with my dipper? I am too much interested in the electrical end of the automobile business and delight to follow the theories and advancement of electrical science.

Now about the six questions pertaining to the number of different electrical units used in the automobile, will say that I might preface these few remarks like all the other engineers and designers by stating that it is too early in the game to foretell with any accuracy as to what will be the eventual standard practice. But as for myself I have strong leaning for the single unit or to have the ignition by magneto and the starting and lighting combined, which you might call the two-unit system.

Now for the ignition end of the matter, when you come to realize the matter from all points (the magneto dual system) little can be asked or desired. The magneto has at the present day reached a high degree of perfection and is about as reliable a part as any other part of the car. You will realize this all the more when you learn that there has been an untold amount of abuse heaped upon the magneto of which it was entirely innocent, yet it got the credit of the trouble just the same.

One of the worst troubles about magnetos, especially in the past, has been its location. This is not the fault of the magneto but the mounting. When the magneto is driven from the pumpshaft and this shaft is parallel with the crankshaft of the engine it is usually placed so low that it is impossible to see in the breaker box how the adjustment is and you usually have to remove it entirely from the car to test and make what adjustments are necessary.

Magneto and Pump on Same Shaft

I notice a good design being used by several foreign makers also several American builders by mounting the magneto and pump on the same shaft, this shaft being driven by spiral gears from the camshaft, the pump and magneto shaft being set at right angles of the crankshaft, the pump located on one and the magneto on the other and the gears in the middle. This not only simplifies the ease of making water connections but it

brings the magneto up near the top of the cylinders and then the end of the magneto is exposed next to you where it is extremely easy to get at both the distributer and breaker box.

Now for the combined starter and generator (motor-generator). There are many attractive features in this that are impossible with other systems. At the outset there is one feature that cannot be avoided with any system. That is, you have to deliver a definite amount of power to turn the engine over, whether this power is applied by a slow-speed, heavy motor or a small, light, high-speed machine geared down. Furthermore, the power applied to the crankshaft in starting is slightly in excess of the ratio of crankshaft speed to the power applied, or, to express it in another way, it requires more than twice the power to turn the engine over at a speed of 100 revolutions per minute than would be needed to crank it over at 50 revolutions per minute.

Sixty Revolutions Per Minute Sufficient

To my mind, if an engine is in proper trim, the way it always should be, a speed of 50 or 60 revolutions per minute is quite sufficient for all practical purposes, but if everything is partially out of shape and some parts are out of adjustment a speed of 100 revolutions per minute is not too much to be reliable in starting. The main argument with everybody is, it seems, that with a motor generator you have a compromise, or a machine that is not high in efficiency either as a generator or motor. Now this is probably true in the general run of cases but when you come to realize the peculiar service demanded of such a machine in automobile work this inefficiency can be easily obviated.

Motor-Generator Well Adapted

Remember that any machine that is capable of turning the engine over when used as motor and designed to give high efficiency when used as such has capacity to be used as a dynamo. Now the question comes in, how are you to have this same machine run with equal efficiency as a dynamo? Here is where a motor-generator is especially well adapted to the automobile. When you realize that if the charging rate is one-twentieth to one-fortieth the rate of discharge when starting it puts a different face on the matter. Why not fit such a machine with two commutators, one at either end, and have the same number of commutator bars as there are armature coils on one end, this end to be used as a motor, for by so doing you have all the armature coils in service when used as the starting motor. The commutator on the opposite end can be fitted with one-fourth or one-half the number of segments and each fourth, or each alternate, armature coil could be connected to the proper segment, thereby cutting down the capacity of the charging rate to any proportion desired. The coils that are not connected to the generating end are simply cut out of service when running as a dynamo but you have the full set of coils to be used when running, as the starting motor. Furthermore, when such a machine is running as a dynamo, the armature coils that are not in service are simply dead matter and have no connection with the others. Therefore the excitation of the fields is not interfered with and the current used in the fields is in proportion either way, whether it is delivering a small current as a dynamo or absorbing a heavy current when used as a motor.

Reverse Current Cut Out Necessary

With such a machine you would need two small wires running from the generating end to the storage battery, using the usual reverse current relay with cut out and if desired an ammeter could be cut in on this circuit to show the charging rate and on the starter end the usual switch in the circuit from the battery to use in starting.

With this machine you have all the advantages of the two-unit system and weight reduced equal to the weight of the starting unit alone of any two-unit system. Also the job is simplified to the minimum as there is only one unit to mount on the car. Again, the weight could be lowered about one-half by using a 12-volt machine and 12-volt battery and by the old three-wire system from the battery, that was familiar in the days before alternating current became popular, you have all the advantages of the 6-volt lighting system which has now become standard. The large wires used with the 6-volt system to carry the current used when starting can be two-thirds less in size, the line loss being the same in either case.

New York City. J. K. MERCER.

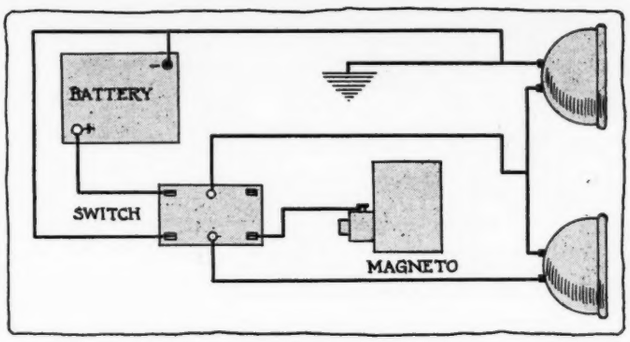


Fig. 5—Switching from Ford magneto to battery for lighting

Ford Headlights on Battery and Magneto

Editor THE AUTOMOBILE:—In THE AUTOMOBILE for September 25, E. C. Kornhoff inquires for a method of switching Ford headlight from magneto to a 6-volt storage battery with the use of only one switch.

The accompanying diagram shows how this may be done, the switch used being a double-pole, knife switch, the same being procurable from any electrical supply house.

No. 2 pole of this switch is not used, the blade running from the center pole to No. 1 pole being the only connection necessary to throw the lamps in series on the magneto Fig. 3.

When the blades are thrown over to poles Nos. 3 and 4 lamps are connected in parallel on the 6-volt battery.

East Orange, N. J. H. F. HERDMAN.

Oil Trouble Cured on Flanders 20

Editor THE AUTOMOBILE:—Referring to an inquiry in regard to oil leaks around valve tappets in THE AUTOMOBILE for September 11 and answered by you therein, asking for information about the oil on the two-speed Flanders, I would say that I have had considerable experience with this particular car and have found by experiments how to regulate the oil so that it will not give the trouble that the inquirer is having.

This is done by simply taking the oil tank off and soldering a thin piece of copper or brass over the lower ends of both pipes and then testing the oiler for leaks. Be sure that the tank is air tight. Next drill two 3/16-inch holes in the pieces you have soldered on close to the top and bottom edges as shown in the illustration shown at the head of this page.

Ashtabula, O. V. L. WARREN.

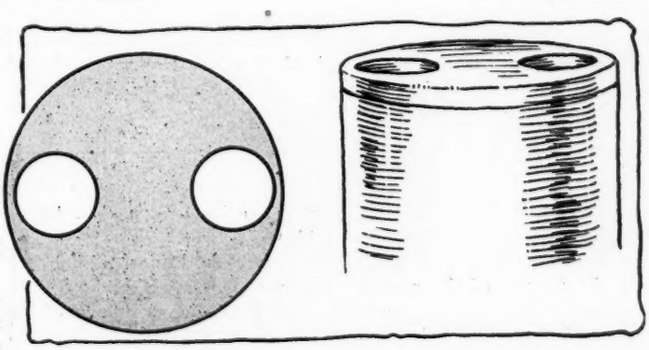


Fig. 6—Copper soldered on end of Flanders oil pipe

The Engineering Digest

French Generators for the Lighting of Cars with Novel Means for Equalizing Voltage

Electric Lighting of Cars Being Popular While a Starting Equipment is Considered Less Needful, New Generators in the French Market are Designed with an Eye Single to Their Use for Illumination Purposes—A Preference for Alternating Current and Permanent Magnets is in Evidence

GENERATORS which have been perfected of late in France with a view to their use for starting and lighting of automobiles differ in some details from those developed in the United States and in Germany.

The KW generator shown in Figs. 1 and 2 produces an alternating current. It can therefore not be used for charging a battery, the complication with a converter being impracticable for a car. It is intended only for giving a strong light on the road while the car is moving, and to do this with the greatest convenience and the smallest expense, while kerosene lamps are used concurrently with it for producing the necessary light when the car is at a standstill.

Each turn of the armature shaft corresponds to two periods of the alternating current, and it is geared to twice the speed of the motor shaft, which represents a sufficient speed for producing a steady light, especially as the filaments in electric headlights for automobiles are made quite coarse in view of the vibration they must resist and do not lose the heat imparted to them very rapidly. [If bulbs containing nitrogen at atmospheric pressure instead of an approximate vacuum of ordinary ar become widely adopted, this element in a lamp with alternating current would have to be reconsidered, however, as the nitrogen would act as a conductor of heat. A greater frequency would then probably be demanded.—Ed.]

This dynamo has no rotary wiring. Its armature is stationary and consists in a simple roll of copper tape D wound between two aluminum plates *e* and surrounding a rotary iron core. This core also constitutes the shaft of the rotary field. It carries at one end the massive transverse bar A and at the other end the similar bar B, which serve as the poles of the armature, these bars being at right angles with one another. The pole pieces E E are maintained constantly magnetized by three permanent horseshoe magnets G and are placed in such relations that when one is opposite to bar A the other is opposite to bar B at right angles therewith, and the lines of magnetic force generated by the magnets consequently travel from one piece to the other by way of the rotating core.

When the core has made a one-half turn the elements are in the same position as before, except that it is the opposite end of each bar which is now uppermost and adjacent to a pole piece. At a quarter turn, on the other hand, the pole piece before contiguous to A is now contiguous to B, and the direction of the lines of force is therefore reversed. The frequency of the current created in the stationary armature coil D must thus be twice that of the rotation of the field.

A further consideration of the construction brings to light why the voltage of the current produced is independent of the speed of rotation without complicating the device with any of the expedients which it is necessary to adopt when it is a direct current which is produced from a generator of variable speed. The fundamental principles of electro-magnetism account for this peculiarity. Each time when a variation is produced in the magnetic flow in a core surrounded by a conductive circuit there is produced in this circuit a current whose magnetising action is opposed to the variation of the flow, either to hinder it in diminishing when it is diminishing or to hinder it in increasing when it is increasing. This action is never sufficient to suppress the variation and it cannot even, without aid, from other features of the construction modify the maximum and minimum values of the flow, but it retards the moment when the maximum or the minimum is produced.

Applying this general law to the KW generator, it is seen that the effect is to reduce the voltage which would naturally be produced at high speed and to increase it at low speed; in other words, it results in a tendency to constant voltage within certain limits of speed which can be sufficiently wide apart for practical purposes if the dimensions of the generator are chosen accordingly. The details of the action make this clearer:

When the ends of the transverse bars A and B are at rest exactly opposite to the pole pieces the magnetic flow traversing the core is at maximum. When now the field is rotated rapidly and the armature coil is in open circuit, the latter has no electric effect; no induced current is generated around the core and the flow takes in reality its maximum value at the exact moment when the bars arrive at the most favorable positions. But, when the circuit is closed by the lamps, an induction current is produced, and this current has the magnetising effect upon the core just referred to. It retards the maximum until the bars have passed a little beyond their most favorable position opposite the

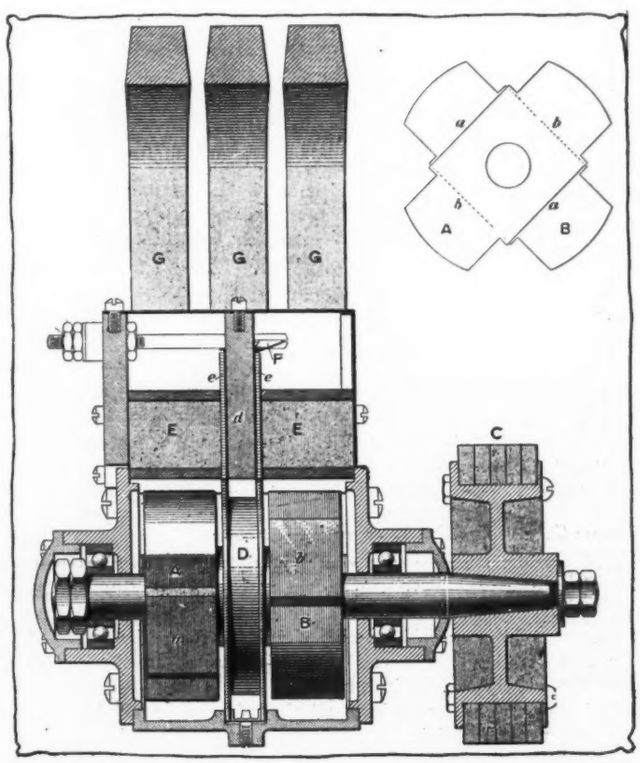


Fig. 1—Section of KW alternating-current magneto for headlights

pole pieces. Being produced at an unfavorable moment the maximum flow is therefore smaller than at rest. And the greater the speed of rotation the more the maximums of each period are displaced in proportion to the duration of a one-half turn of the field. While this action is exactly the same as that which is aimed at for self-regulating generators, the simple mechanism used in this instance does not realize such self-regulation completely, but the voltage increases only very slightly with the speed. For automobile purposes this increase with its resulting increase in the intensity of the light emitted by the lamps may be considered an advantage, as more light is required the faster the car is running.

If tungsten filaments are used, small variations of the light are counteracted through the fact that these filaments offer a greater resistance to the passage of a current the hotter they are.—From *Omnia*, Sep. 6.

Special Design of Vibrating Regulator

In the Delaux generator the voltage is kept constant by means of a vibrating regulator. The generator itself is of standard design, differing from other lighting dynamoes only by having the field made in an upper and a lower part, so that the armature may be inspected and removed without interfering with the mounting and alignment of the whole machine in the car chassis. The ball bearings which determine the alignment are mounted in the lower portion of the field which is not disturbed when the armature is taken out. This feature is borrowed from generators used for street cars and is shown plainly in Fig. 3 (in which the hood covering the brushes and the commutator is omitted). The vibrating regulator is placed on the dashboard of the vehicle and is built in one with the circuit-breaker or so-called cut-out, which is of the usual design.

The accompanying diagram, Fig. 4, gives the connections of the generator, the battery and the regulator and shows that the latter constitutes a sort of magnetic frame, CCCC, of which one side is interrupted at both ends. In the gaps thus created there are placed rotary magnetic cores of which one controls the cut-out and the other the regulator. The lower side of the frame comprises a fine wire coil connected with the terminals of the generator, and a coarse wire coil which is traversed by the current furnished by the generator when the cut-out is closed. The rotary armature of the cut-out is carried on a mild curved spring and that of the regulator on a stiffer straight spring.

The regulator acts upon the well-known principle of short-circuiting periodically an exciting-rheostat in the generator circuit. An adjustable screw comes in contact with the rotary armature of the regulator every time it takes distance from the stationary core, and thereby re-establishes the short-circuit of the rheostat. The magnetic frame serves the purpose of completing the circuit of the magnetic flow and thereby permitting it to reach a high voltage, and by virtue of the high magnetic force obtained by this means the vibration of the rotary armature becomes very rapid. Thanks to this rapid vibration, the current in the fields becomes almost constant instead of varying between remote limits, and the lighting effect becomes absolutely uniform. Another effect of the high oscillatory speed of the regulator, or of the artificial constancy of the exciting-current, is that the heating of the field magnets by hysteresis and Foucault currents is reduced to a minimum.

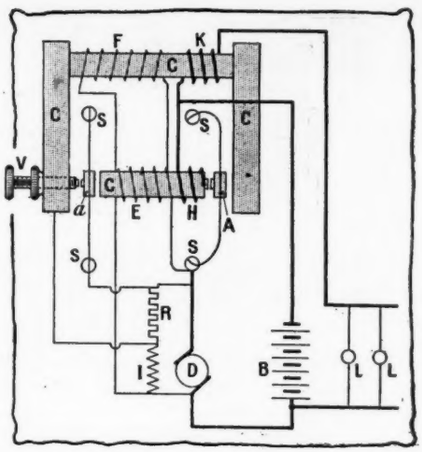


Fig. 4—Wiring of combined regulator and cut-out in Delaux generator

As in all vibrating regulators, the compounding of the current accomplished by the coarse wire coil not only safeguards the functioning of the cut-out but also produces a useful variation in the voltage of the generator while the battery is being charged. When the battery is nearly exhausted, the voltage of the generator is relatively high and tends to produce an excessive charging-current. But when passing through the coarse wire windings of the regulator the current magnetizes this wire and consequently the fine wire coil is relieved of part of its work in effecting the total amount of magnetizing necessary for attracting the rotary core of the regulator. The voltage required at the terminals of the fine wire coil, and therefore also at the terminals of the generator, in order to have the attraction of the armature take place, can thus be lower. The regulator begins to vibrate in response to a lower voltage. In other words, the presence of the coarse wire coil has the effect that the voltage furnished by the dynamo generator will be lower the more the generator is drawn upon for current; that is, the more

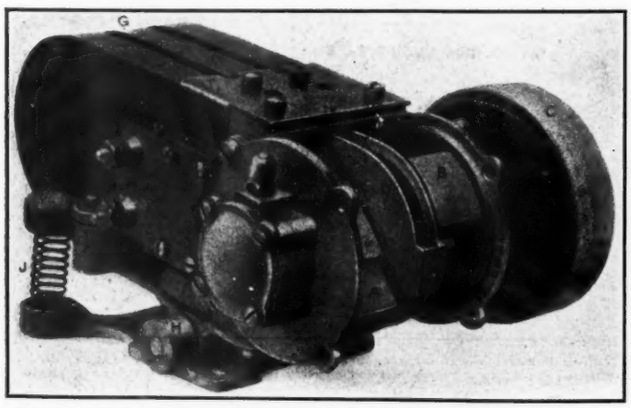


Fig. 2—KW lighting magneto—casing removed

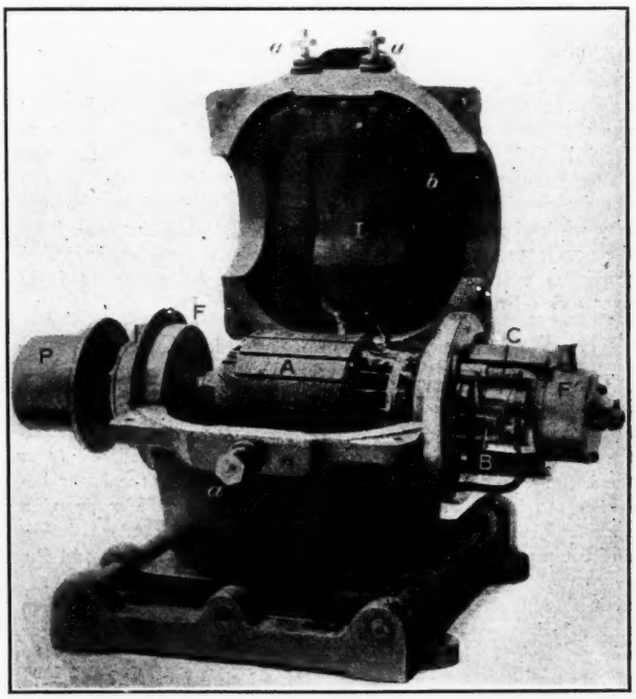


Fig. 3—Delaux generator with divided field—end casing removed

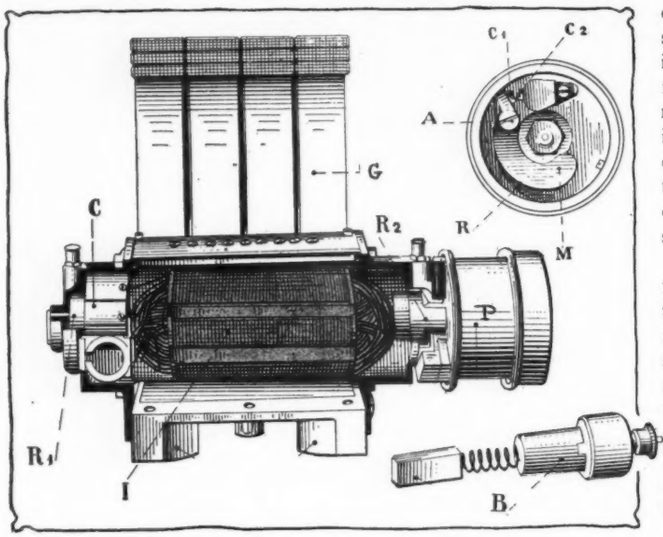


Fig. 5—Mira-Mestre lighting magneto with cut-out; brush and holder separate

the battery, being nearly discharged, draws upon the generator.

This feature of the construction has thus the merit of causing the generator to accommodate its voltage to the variations in the voltage of the battery during the charging of the latter, thereby avoiding deterioration of both generator and battery from an excess of current while yet realizing a complete charging.

The function of the coils of wire on the upper branch of the magnetic frame is yet to be explained. One, the fine wire coil F is in parallel with the fine wire coil E of the regulator core *a* and simply supports the work of the latter. The coarse wire coil K is traversed only by the current furnished to the lamps. When the lamps are lighted there follows a drop in voltage of the battery, due to internal resistance, which is so much greater as the required output is greater. By reacting in the same manner as the coarse wire coil H which is traversed by the whole current of the generator, the coil K slightly lowers the voltage of the generator, and this arrangement increases the uniformity of the light. Supposing for example that the cut-out has been opened by reason of the motor slowing up. Then the voltage of the generator is suddenly displaced by that of the battery; and the latter is low if the battery has worked much. Now, as the coil K has also lowered the voltage of the generator, the change is less noticeable. The action of this coil is, however, not sufficiently pronounced to prevent the charging of the battery while the lamps are in use, but by reducing the feed from the generator to the battery at times when the generator is also providing current for the lamps it saves the generator from overwork.—From *Omnia*, Sep. 20.

Permanent Magnets with Direct Current

The Mira-Mestre generator resembles the KW in so far as it is really a magneto, employing permanent magnets. The outfit comprises a generator, a battery and a circuit-breaker between the two, the latter, as usual, serving to obviate discharge from the battery to the generator when the voltage of the latter becomes too low. The permanent field magnets are made of a special tungsten steel, while the armature is of standard design and rotates between the pole pieces on ball bearings R1 and R2. A current is generated at a very low speed because the magnetic flow from the permanent magnets is much stronger than that which may be obtained from electro-magnets which have not yet been excited. An 8-volt lamp may thus be lighted by merely turning the armature by hand, which cannot be done with an ordinary generator. For the same reason the charging of the battery goes on at a very low vehicle speed. This being the case the question arises whether the current produced at high speed will not be of excessive voltage. But the reaction arising in the armature creates a magnetic field opposed to that derived from the permanent magnets [on the principle explained in connection with the generator KW.—Ed.] and, due to this retarding influence, the voltage is only increased very slowly with increasing speed. The possibility that the reaction from the armature might become intense enough to demagnetize the field is obviated through the choice of all dimensions and the size and strength of the magnets.

The circuit-breaker which cuts the connection from the battery to the generator at very low vehicle speeds is of the centrifugal-governor type. It comprises a metallic piece M which can oscillate around a spindle A and is actuated by a spring R so that the contact C1 is pushed away from contact C2. This mechanism is contained in the pulley P at the end of the armature by which the latter is rotated. Only when a certain minimum motor speed is reached the centrifugal force of piece M overcomes the spring resistance and closes the circuit by bringing C1 and C2 together. The workmanship in this generator and the results secured from it are said to be of the best.—From *La Vie Automobile*, August 23.

Upside-Down Motors at Kaiser Prize Contest for German-Made Aviation Engines

Recent Events in Aviation Widen the Gap Between Automobile and Aviation Motors But Blaze the Way for Developments Which May Eventually Make Them Alike

SINCE the French aviator Pégoud made his sensational tumbles and upside-down flights with a Blériot monoplane and a rotary Gnôme motor, the advantages of having motors for aeroplanes which will work equally well in any position in which they may be placed through the changing moods of the atmosphere, and in which therefore all functions without exception are independent of the effects of gravitation, have become so widely appreciated in aviation circles—including all the governments and army staffs of the civilized world—that it is more than doubtful whether any motor which does not possess the property referred to can hereafter be at all considered as qualified for aviation purposes, whatever may be its technical and practical excellence in other respects. The change in attitude militates of course first in favor of the rotary motors of the Gnôme type, in which the cylinders revolve in a plane which is normally vertical, and in which therefore variations of up to 45

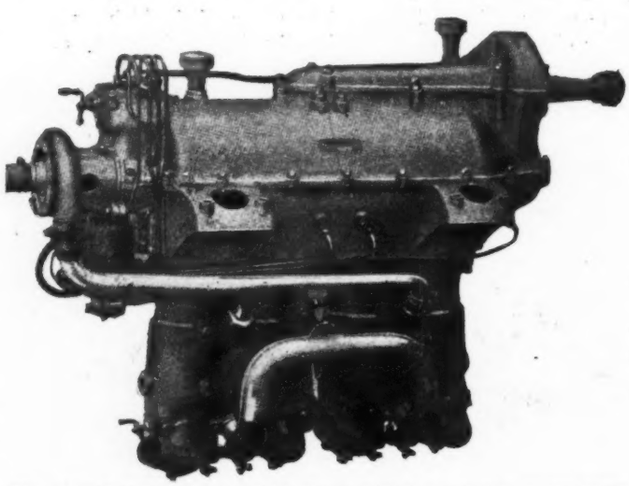


Fig. 6—Exhaust side of upside-down Daimler aviation motor with geared airscrew shaft

degrees in the angle of inclination maintained in the atmosphere bring all the cylinders successively into every conceivable relation to the direction of gravitation. On second thought, however, the question comes up if complete indifference to the effects of gravity, so far as the functioning of the motor is concernd, cannot be realized by means of other types of design, and at this point the motors with hanging cylinders which were entered by the German Daimler company in the contest for the Kaiser Prize for the "best German-made aviation motor" which was held and elaborately worked out in Germany last spring, come into the spotlight and crave a larger share of public interest than was accorded them when they were first shown. When it is noted that one of these motors was held worthy of the fourth prize in the contest on the strength of its performance and certain peculiar advantages but without any reference at all to the property which Pégoud and Blériot have now pushed into the foreground of considerations, and that apparently no constructive reason exists why these motors should not work as well in one position as in another, those interested in motor construction and opposed to the air-cooled motors of the Gnôme type on technical grounds—large oil consumption and low power for the unit of cylinder volume—have reason for looking into the construction of the hanging Daimler motors.

Advantages of Hanging Cylinders

The information about these motors which is at present accessible is derived solely from the official report of the Kaiser Prize contest and is not exhaustive. The hanging motors which were entered were in the main reconstructions of the upright 65-horsepower Daimler motors which also took part in the contest. In one of the models the shaft of the airscrew was directly in prolongation of the motorshaft. In the other, which is shown from the exhaust side in Fig. 6, a reduction gear is interposed between the two shafts with a view to the reconciling of motor and airscrew efficiency. Fig. 7 gives a cross-sectional view of the same. The merits for which this motor received the fourth award were the following: Lowering of the center of gravity of the aeroplane machine as a whole; allowing pilot and observer a free view ahead; low location of carbureter, permitting fuel feed by gravity [of no value from new viewpoint]; hottest parts of cylinders lowest, where cool water enters, and cooling therefore more effective, with escape upward for possible steam bubbles; low exit for exhaust, so that the crew is no longer exposed to the hot gases or the oil thrown out with them.

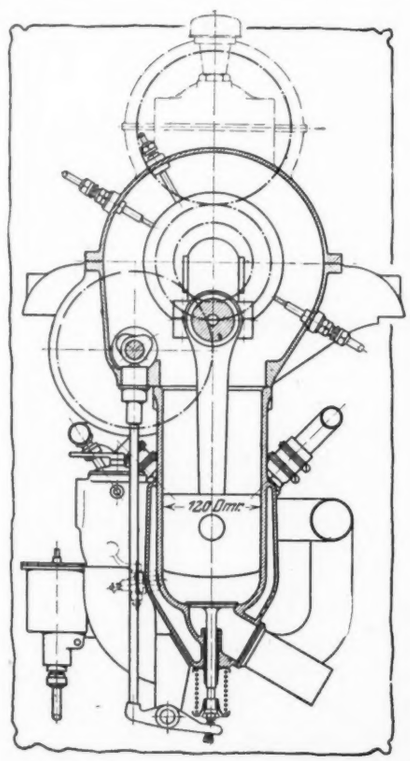


Fig. 7—Transverse section of Daimler reversed aviation motor, with gear-drive for airscrew shaft indicated

The point in construction most affected by the reversal of the cylinders is the lubrication. As compared with the normal 65-horsepower motor, the crankcasing is smooth, the bay serving for oil reservoir being removed. Instead of having one pump for oil circulation and another for fresh oil feed, to replace the oil used and wasted, the hanging motor has only fresh-oil lubrication and an oiler mechanism with many ducts taking the lubricant in measured quantity to every bearing. Oil was not used twice. The oil consumption was for this reason large, but it is considered in the report of the event that this drawback to the type could be avoided by a modification of the crankcasing.

The water pump is driven directly from the crankshaft, and the magneto hangs under the same. At the trials no fouling of the spark plugs was experienced and, in general, no special disadvantages of the type were brought out, although one test extended over 5 and another over 16 hours, the first at maximum capacity. The motor with geared driving of the airscrew weighed 148 pounds, the other 133 pounds. The standard speed of both was about 1400 revolutions per minute. Bore and stroke were 120 by 140 millimeters.

The second prize in the contest was awarded for the Daimler company's new six-cylinder aviation motor developing 75 to 90 horsepower with bore and stroke 105 by 140 millimeters and weighing 142 kilograms. This motor has very thin steel cylinders and works with a mean piston pressure of 8.04 kilograms per square centimeter, entirely successfully, and it is now stated that all Daimler aviation motors, including those of the hanging type, will henceforth be made with steel cylinders.

The Importance for the Automobile Industry

The new turn in the situation for aviation motors is of deeper interest to the automobile industry than at first apparent. A motor plant—including fuel and oil supply—working equally well in any position is intrinsically a superior mechanism. It has merits for transportation in the mountains, for excavating and other very rough work. It means practically freedom from danger of fire when a car turns turtle without being materially injured. More important, perhaps, is the opportunity which the building of upside-down motors will afford for trying out new relations of one motor element to another, new oiling systems and new relations of the motor to the car chassis in which it might be placed. Either the motor may be lowered in the chassis or the crankshaft may be raised, giving an opportunity, for example, for introducing a master reducing-gear at the front end of the transmission for heavy motor trucks without interfering with the height of a driving shaft, or for increasing the volume-capacity of trucks forwardly without getting the load platform too high.

Interchangeable Motors for Land and Air

Another consideration which eventually must be of great importance from the military standpoint and in the interest of aviation generally is that the possibility of removing a power plant from an automobile and placing it in the frame of an aeroplane—ready and fit to propel it—would make aeroplanes for war purposes much more useful and dependable and, further, that a development calling for the same class of motors in those automobiles and in those aeroplanes on which a government would depend for war or colonization work may be looked for; not at once but the moment a type suitable for both can be produced at the cost of an automobile motor. A step of this nature would be in the direction of the standardization which is already strongly insisted upon by all army staffs for their whole automobile equipment.

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SINCE the crankcase became a two-story oil reservoir, none too large, no provision for a separate oil tank is made in French chassis, says Pierre Giffard in *Omnia;* yet a reserve is required, as shown by the fact that all carry a can of oil somewhere. He recommends to design a nook for it under the engine hood where the greasiness is unobjectionable. And the oil-gun should have its place there, too.

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What of the Show?

THE announcement by practically all of the tire makers that they will not exhibit at the coming New York show and a similar announcement from the makers of ball and roller bearings, coming but a week before the allotment of the space for accessory exhibitors, suggests the growing feeling that shows have outlived their usefulness so far as some parts of the industry are concerned. Several months ago the motor truck people voted that they did not want any more shows; now the tire and bearing people have said that they will not exhibit. The question naturally arises, Where will the end be?

The action of the bearing manufacturers is but a logical and natural one. Their wares are sold to the manufacturer and are naturally of little interest to the casual visitor at the show, who if he desired to have a particular make of ball or roller bearings in the gearset or axle of his car could not be satisfied, as the maker would refuse to depart from his regular practise in this regard.

With the tire people, however, it is different. They sell to the car owner, the man who attends the show and makes it possible. Heretofore tire makers have had the choice exhibit spaces, spaces that were expensive, so expensive, the tire makers claim, that the expenditure was not commensurate with returns. The shows offer an excellent opportunity for tire makers to demonstrate the merit of their wares to possible customers. Every car owner must buy tires and shows should prove one of the best means of demonstrating. If tire people find the shows not a success then it is only to be expected that makers of car parts such as axles, gearsets, motors, steering gears, frames, forgings, castings, etc., would find little value coming from the crowds attending the exhibitions.

The result of the present withdrawal of the tire and bearing interests will be closely watched and if the tire people, in particular, discover no drop in business then more withdrawals can be looked for in the show of 1915.

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Savannah Races Off

SAVANNAH, in announcing that she will not stage the Grand Prix and Vanderbilt cup races this fall because of inability to secure entries, has lost a good opportunity of booming the industry at a time when every little bit helps and also at a time when a few more Indianapolises, a few more Elgins, a few more Santa Monicas and a few more Coronas are badly needed. 1913 has been a poor contest year. Makers have religiously held aloof. They have offered no excuses other than that they do not want to contest. With some it has been a matter of expense; with others lack of time is the excuse advanced. No matter which, contests have lagged and with this lagging has been a most perceptible lagging of public interest. The daily press has in many places dropped its daily column. The prospective buyer, who watched the contest reports from day to day to whet his appetite for a new car, now lets his appetite grow dull and the maker must spend money in other channels to keep his product in the mind of such.

Throughout the country dealers feel that boosting as obtained by contests is necessary. In half a dozen states dealers have banded together and made trips through their territory to drum up business, to fan the flame of enthusiasm and to work some business into otherwise dull months. It is a long time since many dealers felt the need more for good live contests, contests that tell a story to the buyer who is looking for a new car. Stock car contests are looming larger than they have for several years. Today the dealer and the manufacturer are looking for means to sell cars and to sell them to new buyers.

There are innumerable green fields waiting for conquest in the contest realm. Thousands of prospects are waiting to be interested in the road performance of motor cars. The rigid contest has many lessons to teach. The public is asking for information on self-starters; the actual merits of electric lighting are being discussed; the fuel economy of the six-cylinder car is open for discussion; the reduction of car weight is a permanent question; these and many other car questions can be partly answered by contests; and if the final answer is not found in the result of the contest, there will be enough good coming out of it to warrant the expenditure many times over.

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Motor Replaces Army Horse

FRANCE has literally seethed with motor contests during the past year. She has kept the band playing from start to finish and industrial reports show that the industry is in a solid state, in fact, that business this year is greater than for several years past with many of the leading companies. If contests have any value as trade stimulators, then France has enjoyed and is today enjoying the fruits of her contest work.

Pope Statement of Income $259,000

Automobile Sales Show An Increase Over 1912 Business— Net Profits Lower Than 1912

HARTFORD, CONN., Oct. 7—The fifth annual report of the Pope Mfg. Co. for the fiscal year ending July 31, 1913, shows a decrease of $171,870 in net profit as compared with 1912, the net income for that year being $316,877, while that for 1913 was $259,239.40. In presenting the report President Albert L. Pope states that gross sales in both bicycle and automobile departments showed an increase over previous years, largely due to a new model low-priced automobile and some new motorcycles all put on the market for the first time this year.

Unexpected expense was incurred in the development and perfection of the new motorcycles, while the profit on the automobiles was materially cut down by the necessity for equipping with self-starters and lighting systems not provided for in the original design or price. The expenses of the company were also increased by very heavy interest charges occasioned by the large amount of money which the company was obliged to borrow at very high rates on account of the condition of the money market.

Recently the Hartford factory known as the West Works was closed owing to the concentration of manufacturing made possible by the new addition to the main works. The West Works is to be sold and a great saving in manufacturing expense will result in the centralization of operations at the main plant. A comparative digest of the income account of the company for the past 4 years follows:

	1913	1912	1911	1910
*Income from operation	$259,239	$316,877	$169,309	$664,496
Other income	.....	.....	107,928	127,980
Total income	259,239	316,877	277,238	792,485
Miscellaneous loss and expense	81,867	65,587	63,119	47,094
Interest, discount and commission	148.460	.....	.....	.....
†Reserves	96,464	.....	.....	.....
Deficit	67,551	251,290	214,119	745,391
Dividends	104,319	174,800	137,892	368,054
Deficit	171,870	‡76,490	‡76,227	‡377,337
Previous surplus	1,012,921	936,430	860,203	482,866
Total surplus	841,051	1,012,920	936,430	860,203

*After deducting manufacturing and producing costs, depreciation, replacements, renewals, administration, office and selling expenses.
†Reserve to provide for reduction in value of inventories and drafts receivable.
‡Surplus.

The general balance sheet of the Pope Manufacturing Co., as of July 31, 1913, compares as follows:

ASSETS.

	1913	1912	1911	1910
Real estate, plants and patents	$6,241,070	$5,620,251	$5,817,569	$5,578,245
Deficit, charges and preparatory expenses	169,198	363,333	156,868	100,308
Contracts	160,242	170,844	183,641	190,871
Materials and supplies	1,688,748	1,477,313	1,190,841	854,660
Accounts, etc., received	715,701	396,608	338,329	273,578
Cash	115,123	253,829	92,061	557,945
Total	9,090,082	8,282,179	7,779,310	7,555,610

LIABILITIES.

Capital stock outstanding	$6,019,000	$5,989,000	$5,989,000	$5,889,011
6 per cent. coupon gold notes	1,000,000	1,000,000	.....	.....
Reserve for replacement, etc.	.....	.....	458,597	404,135
Loans	510,000	.....	175,000	.....
Accounts payable	534,315	179,538	141,686	232,456
Payrolls account	24,069	33,750	11,625	9,877
Deposits, etc.	45,848	46,811	46,403	39,430
Reserves	96,655	.....	.....	.....
Contingent liabilities	19,145	20,160	20,561	80,506
Profit and loss	841,051	1,012,921	936,431	860,203
Total	9,090,082	8,282,179	7,779,310	7,555,610

PONTIAC, MICH., Oct. 6—F. H. Berger, chief engineer of the Oakland Motor Car Co., Pontiac, Mich. has resigned. N. E. Wahlberg, engineer for the Durant-Dort Carriage Co., Flint, Mich., who formerly held a similar position with the Oakland company, takes Berger's place.

DETROIT, MICH., Oct. 4—John A. Boyle has resigned as vice-president and general manager of the Briscoe Mfg. Co. Mr. Boyle has been with this company since its inception.

Warren Car to Be Built in Two Models

Dunk and Associates Buy Stock of Warren Company and Will Begin Manufacture of Cars

DETROIT, MICH., Oct. 7—A. D. Dunk, president of the Auto Parts Mfg. Co., is at the head of a close corporation which has purchased the stock of the Warren Motor Car Co. from the Rands Mfg. Co., which bought it at receiver's sale recently from the Detroit Trust Co. The Rands concern wanted the buildings only for extensions to its business of manufacturing windshields, top irons and other motor car fixtures and hence this resale of the equipment and supplies is not unexpected.

Mr. Dunk and his associates will continue the manufacture of motor cars under the Warren name and will call their concern the Warren Motor Car Co. No location for the manufacture of cars has yet been settled upon. Mr. Dunk states that no factory will be built, but rather a plant will be sought already erected.

The policy of the new Warren concern will be to continue the models along the same lines, but there will be fewer of them, only one four and one six-cylinder model being planned. The company will build some cars for 1914, but does not expect to turn out over 500 this first year, 1915 plans calling for a larger schedule. It is probable that the new Warren concern will be in a position to close with agents in about 90 days, according to Mr. Dunk.

Mr. Dunk still retains his connection with the Auto Parts Mfg. Co., although he has given up its active management.

Foreign Tire Makers Cut Prices

NEW YORK CITY, Oct. 6—Promptly following the 25 per cent. reduction in the tariff on tires the importers in this field are announcing new price lists which show a material reduction in prices to the consumer. The duty on tires is now 10 per cent. as compared to the former duty of 35 per cent. By utilizing this entire reduction to cut the price to the consumer the Gaulois Tire Corp. has been able to cut the price on such a popular size for example as 34 by 4.5 from $50.85 to $41.75, a reduction of $9.10 on each shoe. Tubes of this size have been reduced from $13.35 to $10.95. Corresponding reductions are made in all the other sizes. The Prowodnik has issued a price list under date of October 1, 1913, which shows corresponding cuts in price. The 34 by 4.5 size, for instance, has been reduced from $68.75 to $54.30, in the non-skid grade. Mr. G. W. Elbertson, of the Englebert company, who has just returned from Europe, will also shortly announce a new price list.

Government to Buy More Trucks

WASHINGTON, D. C., Oct. 8—*Special Telegram*—The general supply committee has prepared specifications and within the next few days will call for bids for furnishing the nine executive departments here with motor trucks. The number of trucks to be purchased has not been determined but it is expected each department will ask for two or more trucks. Makers desiring to bid on these trucks should communicate with the general supply committee.

Budd Sells Detroit Factory

DETROIT, MICH., Oct. 7—The Edward G. Budd Mfg. Co., motor vehicle body manufacturer, has sold its plant in this city to the Peter Smith Heater Co., manufacturer of railway car heaters. The Budd concern occupied the factory formerly owned by the Grabowsky Power Wagon Co., now out of business, and early in February of this year moved its main manufacturing business to this city with Theodore Millington in charge. The latter severed his connection with the Budd people recently and is now located with the Detroit Body Co. The machinery, stock and other apparatus of the Budd Company is being moved back to Philadelphia.

AKRON, O., Oct. 4—T. H. McGiehan, who for the past year has been general manager of the Motz Tire & Rubber Co., Akron, O., was recently elected vice-president.

Automobile Securities Quotations

No changes of any importance appeared in this week's securities quotations. The common stock of the Goodyear Tire & Rubber Co. dropped 9 points, due to the unsettled condition in the rubber markets. The Consolidated Rubber Tire Co. and the B. F. Goodrich Co. both dropped 2 points.

	1912 Bid	1912 Asked	1913 Bid	1913 Asked
Ajax-Grieb Rubber Co., com	150	175	155	160
Ajax-Grieb Rubber Co., pfd	90	98	95	100
Aluminum Castings, pfd	100	102	97	100
Chalmers Motor Company, com	..	..	..	102
Chalmers Motor Company, pfd	..	..	..	102
Consolidated Rubber Tire Co., com	13	15	35	37
Consolidated Rubber Tire Co., pfd	50	60	92	95
Firestone Tire & Rubber Co., com	270	275	265	275
Firestone Tire & Rubber Co., pfd	107	109	102	104
Garford Company, pfd	99	100	90	93
General Motors Company, com	36⅜	37½	39	39½
General Motors Company, pfd	80	81½	81½	82½
B. F. Goodrich Company, com	74½	75	25	26
B. F. Goodrich Company, pfd	106	106¾	88	90
Goodyear Tire & Rubber Co., com	336	340	285	294
Goodyear Tire & Rubber Co., pfd	104	105	97½	98½
*Hayes Manufacturing Company	..	92	..	90
International Motor Co., com	19	21	..	5
International Motor Co., pfd	78	81	10	15
Lozier Motor Company, com	..	..	15	..
Lozier Motor Company, pfd	..	..	..	90
Maxwell Motor Co., com	..	..	2½	3½
Maxwell Motor Co., 1st pfd	..	..	26	27½
Maxwell Motor Co., 2nd pfd	..	..	6	7
Miller Rubber Company	..	140	135	140
Packard Motor Company, pfd	105½	107	95	100
Peerless Motor Company, com	..	..	33	40
Peerless Motor Company, pfd	..	..	87	90
Pope Manufacturing Company, com	37	38	..	9½
Pope Manufacturing Company, pfd	73	75	..	30
Portage Rubber Co., com	..	..	..	45
Portage Rubber Co., pfd	..	..	..	95
Reo Motor Truck Company	9½	10½	..	10¼
Reo Motor Car Company	23	23¾	17	18
Rubber Goods Mfg. Co., pfd	..	..	100	106
Stewart Warner Speedometer Co., com	..	..	61	..
Stewart Warner Speedometer Co., pfd	..	..	96	97½
Studebaker Company, com	41½	43¾	21¾	24
Studebaker Company, pfd	94½	97	77	80
Swinehart Tire Company	99	101	85	88
U. S. Rubber Co., com	..	..	62½	63
U. S. Rubber Co., 1st pfd	..	..	106¾	107½
White Company, pfd	107	109	104	107
Willys-Overland Company, com	..	..	68	69
Willys-Overland Company, pfd	..	..	87	92
*Gray & Davis Co., pfd	..	..	..	102

*Ex. Div.

Quadruple Suits Against Sparks-Withington, Horn Makers, By Lovell-McConnell Interests

NEW YORK CITY, Oct. 7—During the past week four suits have been filed in the Federal Court, Eastern District of Michigan, against the Sparks-Withington Co., of Jackson, Mich., for making and selling its motor-driven horn, called the Sparton.

One is a suit brought by F. Hallett Lovell, Jr., to recover penalties alleged to amount to $24,100. The action is brought under the last paragraph of the Federal Statute 4901, reading:

"Every person who, in any manner, marks upon or affixes to any unpatented article the word 'patent,' or any word importing that the same is patented, for the purpose of deceiving the public, shall be liable, for every such offense, to a penalty of not less than $100, with costs; one-half of said penalty to the person who shall sue for the same and the other to the use of the United States, to be recovered by suit in any district court of the United States within whose jurisdiction such offense may have been committed."

Another is a suit brought by Lovell-McConnell Mfg. Co. for imitation and unfair competition by the Sparks-Withington Co. in making certain of its horns, such as Sparton Model B, in imitation of the plaintiff's Klaxonet and Klaxet.

The remaining two suits are for infringement of eight patents among those under which Lovell-McConnell Mfg. Co. makes its warning signals.

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NEW YORK CITY, Oct. 4—In an answer by the A. Elliott Ranney Co., New York distributor of Hudson cars, to a suit of the Lovell-McConnell Mfg. Co., for an alleged infringement of the Klaxon patents, this company denies ever having manufactured or offered for sale as such any horn even remotely resembling the Klaxon horn. It admits, however, having used one horn on one automobile, which it claimed was made under the patents granted to William Sparks, of the Sparks-Withington Co., on December 24, 1912, under No. 1,048,466. It attacks, though, the validity of the patents granted to Miller Reese Hutchinson and by him assigned to the Lovell-McConnell Mfg. Co., both on the ground of anticipation and non-inventive thought. The numbers of the patents are 923,048, 923,049 and 923,123, granted in May 1909.

Mondex-Magic Car To Have Fischer Motor

New Automobile To Be Made by The Aristos Co. as 1915 Model Will Use Crescent Slide Valves

NEW YORK CITY, Oct. 7—The Aristos Co. is to manufacture the Mondex-Magic car as a 1915 model. The car will have the Mondex-Magic motor, built under Fischer patents covering a vertical, crescent, slide valve embedded in cylinder walls, which provides direct inlet and outlet ports and, according to the makers, eliminates all noise, dirt and grinding of valves, while producing 33 1-3 per cent. greater efficiency for same piston displacements over the old style poppet valve motor, and furthermore showing a saving in fuel consumption of one-third.

The motors will be produced in two sizes, both six-cylinder; one with a bore of 3⅜ inches and a stroke of 4¾ inches; and one with a bore of 4 inches and a stroke of 5 15-16 inches.

Based on results obtained from use of these motors in Europe covering a period of several years, and from road and block tests made here, it is expected by the makers that these motors will show 40 miles or more to a gallon of gasoline, and 1,000 miles to a gallon of oil in light runabouts and one-half that efficiency in heavy seven-passenger touring cars.

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New Company to Make McFarlan

INDIANAPOLIS, IND., Oct. 6—The McFarlan Six, which has been manufactured by the McFarlan Carriage Company at Connersville, Ind., and distributed through a sales company, is to be manufactured and sold in the future by the McFarlan Motor Co. This concern has just been organized and incorporated with an authorized capitalization of $100,000.

Incorporators of the new company are Alfred H. McFarlan, Edward W. Cotton and Burton M. Barrows, but several other capitalists are included in the stockholders

Within the last few days a petition has been filed in the United States District Court here asking that the McFarlan Carriage Co. be adjudged bankrupt and that a receiver be appointed. This petition was signed by the Indiana Lamp Co., the Ansted Spring and Axle Co. and the Scheidel-Thompson Manufacturing Co., all creditors of the McFarlan company. The McFarlan Carriage Co. has manufactured the McFarlan six for a sales company.

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To Make Zip Cyclecars in Davenport

DAVENPORT, IA., Oct. 4—Diminutive automobiles which can carry but two passengers and are propelled by a small motorcycle engine will be manufactured here by the Zip Cyclecar Co., recently incorporated A demonstrator has been turned out and its success as a light delivery car was marked immediately. Already over 200 orders have been received by the heads of the company. The price of the cars will probably be set at about $300. The car is built entirely for use on pavements.

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New Receiver for Nyberg Motor Works

INDIANAPOLIS, Oct. 6—Judge Albert B. Anderson, of the United States district court, Indianapolis, has named Carl Morrow as receiver for the Nyberg Motor Works at Anderson, Ind. Morrow succeeds John C. Teegarden who was appointed receiver by Judge Anderson recently and Frederick Van Nuys who was appointed receiver by the Madison circuit court. Teegarden and Van Nuys resigned.

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NEW YORK CITY, Oct. 6—The H. W. Johns-Manville Co. has taken over the manufacture and distribution of the Mezger Soot-Proof spark-plug, which will hereafter be known as the J-M (Mezger) Soot-Proof plug. R. M. Owen retains his interest in the plug.

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NEW YORK CITY, Oct. 4—S. M. Udale is now in charge of the laboratory and motor testing plant of Joseph Tracy at Rutherford, N. J.

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DETROIT, MICH., Oct. 4—James A. Holihan has severed his connections with the Briscoe Manufacturing Co. Mr. Holihan held the position of assistant general manager.

Freight on Accessories Is Cut 35 Per Cent.

No Change in New Schedule for Trunk Racks—Slight Increase in Cases for Carrying Tires

NEW YORK CITY, Oct. 6—At a meeting of the Western Classification Comn., representing the railroads from Chicago west to the Rocky mountains, several changes were made in freight rates on accessories connected with automobiles and other machines. According to the new rate which applies to the territory from Chicago west to the mountains, there is a reduction of approximately 33 per cent. in attachments for automobiles. There is not any change in the new schedule for trunk racks. The new schedule shows a slight increase in cases for carrying automobile tires, undoubtedly due to the bulky nature of these articles. The schedule below in which the new rate, as well as the present rate, is given, shows that up to the present there has not been a specific rating for accessories, trunk racks, and tire cases, so that the new schedule rates these in this territory for the first time.

It will be noted that chains for tires have been cut from the first class to the second-class rates; and that windshield frames in boxes have been reduced from double first-class rate to single first-class rate.

Some conception of these reductions may be had when it is remembered that the first-class rate between Chicago and Kansas City is 80 cents and the second-class rate 65 cents. Between St. Louis and Kansas City the first-class rate is 60 cents and the second-class rate 45 cents.

The revised schedule follows:

Article	Present Rate	New Rate
Tractor attachments for automobiles, loose, small parts in boxes	No specific rating....	Less carloads, 1st class
Trunk racks, in boxes or crates	No specific rating....	Less carloads, 1st class
Automobiles, tire carrying cases, in boxes or crates...	No specific rating....	Less carloads, double 1st class
Chains: Automobile tire in barrels or boxes	Less carloads, 1st class	Less carloads, 2d class
Wind shield frames in boxes.	Less carloads, double 1st class	Less carloads, 1st class

Wants Cars Makers' Freight Bills

NEW YORK CITY, Oct. 4—The General Traffic Department of the Automobile Chamber of Commerce, which includes in its labors the checking of freight bills of different car companies, in order to check overcharges, requests the automobile makers to send in their freight bills regularly instead of spasmodically in order that the department can handle the work systematically.

Claims Early Spark Plug Patent Is Basic

NEW YORK CITY, Oct. 2—William Barber has filed a suit in the United States District Court for the Southern District of New York, claiming a basic patent infringement against the following concerns: the Smith-Haines Co., the Motor Car Equipment Co. and the Lowe Motor Supplies Co., all accessory concerns in this city. He claims a basic patent on the type of spark plug which bears the names Red Head, V-Ray and Sootless and demands an injunction, accounting and damages. Mr. Barber's patent No. 732,032, of June 30, 1903, refers to a spark-plug wherein the porcelain is inside the bushing at the ignition and extends part way back through the plug toward the cable end. The remainder of the insulating material is specified as being of some substance less brittle than porcelain.

Phelps to Handle Studebaker in New York

NEW YORK CITY, Oct. 6—Metropolitan representation of the Studebaker Corp. will be henceforward in the hands of the Phelps Motor Car Corp., the president of which is George H. Phelps, who was manager of the Studebaker Corp. of America, New York branch. The new company will not only retail cars in New York City, but will act as distributor for the entire metropolitan district. Its contract calls for more than $1,000,000 worth of Studebaker cars for 1914. The store is at Broadway and Fifty-ninth street.

Market Changes of the Week

No important changes occurred in this week's markets. Beams & Channels dropped from $1.61 to $1.56, while electrolytic copper rose $0.00 1-8 per pound. Cottonseed oil experienced a drop of $0.24 a barrel, closing at $6.97. Lead was dull and easy. On call at the New York Metal Exchange, it was offered at $4.50 per hundred pounds or $0.10 lower than the opening prices on Wednesday. Tin had its usual change in price, this time a drop of $0.68. It was heavier and weaker early on Tuesday with a small demand for spot and nearby positions from consumers. The principal event in the crude rubber trade was the opening of the fortnightly auction of plantations in London. The situation in the market for domestic scrap underwent no material change this week.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Change
Antimony, lb.....	.07½	.07½	.07¼	.07½	.07½	.07½	.....
Beams & Channels, 100 lbs....	1.61	1.61	1.61	1.61	1.56	1.56	— .05
Bessemer Steel, ton	23.00	23.00	23.00	23.00	23.00	23.00	.....
Copper, Elec., lb..	.16½	.16½	.16⅝	.16⅝	.16⅝	.16⅝	+ .00⅛
Copper, Lake, lb..	.16⅞	.16⅞	.16⅞	.16⅞	.16⅞	.16⅞	.....
Cottonseed Oil, lb.	7.21	7.20	7.19	7.13	7.10	6.97	— .24
Cyanide Potash, lb.	.19	.19	.19	.19	.19	.19	.....
Fish Oil, Menhaden, Brown...	.38	.38	.38	.38	.38	.38	.....
Gasoline, Auto, 200 gals.....	.22¼	.22¼	.22¼	.22¼	.22¼	.22¼	.....
Lard Oil, prime...	.95	.95	.95	.95	.95	.95	.....
Lead, 100 lbs.....	4.60	4.60	4.60	4.58	4.50	4.50	— .10
Linseed Oil.....	.50	.50	.50	.50	.50	.50	.....
Open-hearth Steel, ton.....	23.00	23.00	23.00	23.00	23.00	23.00	.....
Petroleum, bbl., Kansas crude...	1.03	1.03	1.03	1.03	1.03	1.03	.....
Petroleum, bbl., Pa., crude.....	2.50	2.50	2.50	2.50	2.50	2.50	.....
Rapeseed Oil, refined	.68	.68	.68	.68	.68	.68	.....
Silk, raw Italy....	....	....	5.25	....	....	5.25	.....
Silk, raw Japan...	....	....	4.20	....	....	4.20	.....
Sulphuric Acid, 60 Baume.....	.90	.90	.90	.90	.90	.90	.....
Tin, 100 lb.....	41.13	41.03	40.90	40.75	40.60	40.45	— .68
Tire, Scrap.....	.08¼	.08¼	.08¼	.08¼	.08¼	.08¼	.....

Movable Assets of Michigan Buggy Company Being Gradually Liquidated

DETROIT, MICH., Oct. 6—At a hearing of the creditors of the Michigan Buggy Co. before Judge Sessions in the U. S. District Court at Grand Rapids on Oct. 3, the Detroit Trust Co., trustee, was directed to enter into a contract with Samuel L. Winternitz & Co., Chicago, whereby the machinery, supplies and equipment of the Michigan company's plant are to be sold at public auction, Winternitz guaranteeing the creditors $225,000 from the sale. The auctioneering firm gets a commission of 12½ per cent. This does not include any manufactured products now on hand. The trustee has sold all of the cars which the Michigan concern had in stock. These went in lots to different parts of the country. The Edward F. Gerber Co., Pittsburgh, whose offer of $350,000 for the remaining assets of the Michigan Buggy Co. was rejected at a previous hearing, purchased 40 of the cars.

This sale to Winternitz leaves the real estate and buildings still to be disposed of, but the trustee will do nothing leading to a sale of the latter until after the other goods have been sold.

The liabilities of the Michigan company on August 6 were appraised at $2,528,723.07. Adding to this contingent liabilities of $422,287.45, the total liability reaches $2,951,010.52. The assets were appraised at $1,261,387.92. Seventy-four banks in different parts of the country have an interest in the assets of the insolvent concern.

Wyckoff, Church & Partridge by Trustee, Sue Successors

NEW YORK CITY, Oct. 6—Chester Griswold, G. A. Ellis and H. C. Dickinson were named as defendants yesterday in a suit brought in the Supreme Court by John S. Sheppard as trustee in bankruptcy of Wyckoff, Church & Partridge, Inc., to recover $50,000.

The complaint alleges that the three defendants, on November 30, 1912, entered into an agreement with H. B. Hollins & Co., as guarantors, to purchase from the trustee in bankruptcy the leaseholds and property of the bankrupt firm for $150,000, which was to be paid for in three instalments of $50,000 each. The first two payments were made, but the third, which fell due on July 30, has not been met, and is the cause of the suit. The assets of Wyckoff, Church & Partridge included holdings in the Standard Auto Co. of New York and in the Decauville Auto Co., and were subject to a mortgage of $248,000.

K-W Loses in Coil Suit

Temporary Injunction Granted in Favor of Unit Coil Co. Prohibiting Further Manufacture Until Royalties Are Paid

CLEVELAND, O., Sept. 18—A temporary injunction has been granted in the court of common pleas, Cuyahoga County, Ohio, in favor of the Unit Coil Co., Jersey City, N. J., restraining the K-W Ignition Co., Cleveland, O., from manufacturing, selling, or using master vibrators and coils made under patents held by the former concern until an accounting of coils and vibrators manufactured since March, 1912, has been made and royalties on them paid.

The suit resulted from the claimed failure of the K-W Co. to carry out the terms of a contract made with the Unit Coil Co., in February, 1912. This agreement provided that the licensee mark consecutive serial numbers, the word "Patented," and the dates of the patents referred to in the agreement, on these inventions, and to furnish the Unit Coil Co. with a monthly accounting and to permit it to verify these monthly statements at any reasonable time.

The letters patent in question are: to William E. Dow, No. 752,384, dated Feb. 16, 1904, for electrical igniter for explosive engines and to Reuben Miller, Jr., No. 754,666, dated March 15, 1904.

Legal Light on Early Electric Starters

NEW YORK CITY, Oct. 4—In the suit of the Dayton Engineering Laboratories Co., Dayton, O., against the Sidney B. Bowman Automobile Co., of this city, for alleged infringement of patent Nos. 745,157 and 842,827, the latter company has answered the former's charges, throwing much light on the early patents of so-called electric starters, which might be expected to fulfill the requirements for starters of internal combustion engines.

The complaint is based on the following: on March 24 of this year, the Sidney B. Bowman Automobile Co. sold a four-cylinder Marmon car, equipped with an electric starting device made by the North East Electric Co., of Rochester, N. Y. According to the claims of the Dayton Engineering Laboratories Co., this device is an infringement of the Delco patents, and the suit was brought against the New York City Marmon dealer, rather than against the manufacturer in Rochester, so as to have the case argued before judges of the Southern District of New York, instead of at Rochester or Buffalo.

The North East attorneys reply to the Delco claims, by citing a great number of patents issued to inventors, covering similar devices and ranging from one which was granted to Thomas Alva Edison more than 20 years ago, to several recent ones issued in England and America.

Zenith-Stromberg Suit Dismissed

DETROIT, MICH., Oct. 4—The Zenith Carbureter Co., of this city, asked the United States Circuit Court on September 30 to dismiss its suit filed in December, 1912, against the Stromberg Motor Devices Co., of Chicago, for infringement of the Baverley patent. The request was granted, costs being borne by the applicant.

Last February a dual situation arose between the Zenith and Stromberg companies in that the Zenith company sued the Stromberg for infringement on the Baverley patent, the Stromberg company having previously sued the Zenith company for infringement of two patents; namely, the Ahara No. 684,662 and the Richard patent No. 791,501. The latter case is still in court and is due for a hearing soon. The Richard patent covers a U-shaped tube used in a carbureter, one end of the tube extending into the mixing chamber, and the other end exposed to the atmosphere.

Isotta-Fraschini Answers in Fiat Suit

NEW YORK CITY, Oct. 4—The Isotta-Fraschini Co. of New York City and Milan, Italy, has answered the F.I.A.T. Automobile Co., of Poughkeepsie, N. Y., and Turin, Italy, in the latter's demand for a bill of particulars regarding several statements made by the former company in its answer to the Fiat charges.

The Fiat company wanted to know when and under whose directions the Ross Gear & Tool Co., Lafayette, Ind., manufactured parts said to be closely resembling the familiar Fiat yoke torque tube construction, as claimed by the Isotta-Fraschini lawyers. It also wanted Maurice Heckscher, president of the defendant company to answer as to the exact construction of the new hinged horizontal yoke used in the latest series of Isotta cars.

The Isotta company answered the Fiat's charges of infringement by declaring that a yoke construction very similar to the Fiat design was patented by Bluford W. Brockett, of Cleveland, O., under patent No. 915,827, issued on March 23, 1909, and also by W. Clark, patent No. 578,915, issued on March 16, 1897. There are also eight British and one French patent named as anticipating the Fiat patent No. 1,050,049. It also declares that the Ross Gear & Tool Co. has been turning out torque tubes and hinged yokes, very closely approaching the Fiat design, for some time previous to the issuing of the Fiat patent to Giovanni Agnelli, president of the Fabrica Italiani Automobili Turino. The Isotta company calls attention, in its last answer, to the date of the application for Agnelli's U. S. patent, which it is claimed to have followed the latter's foreign patent at a longer interval than the 12 months permitted by law.

International Motors to Make Loans

NEW YORK CITY, N. Y., Oct. 8—A meeting of the stockholders of the International Motors Co. was held today as required by charter, the call for the meeting stating the purpose to be floating of a loan of $1,200,000 to take care of manufacturing requirements. As the stockholders were not ready to take definite action on the matter the meeting was postponed for a week.

Reliance Speedometer in Receiver's Hands

BOSTON, MASS., Oct. 3—Judge Dodge in the United States District Court appointed Henry H. Bond receiver of the Reliance Speedometer Co., capitalized at $600,000. Liabilities are $25,589; assets, $43,700. The company is solvent, but is unable at present to borrow money to run the business.

AURORA, IND., Oct. 8—The Boyer Wheel Co., Aurora, Ind., has gone into bankruptcy. J. C. Small was appointed receiver and the judge granted an order to continue the operation of the plant.

NEW YORK CITY, Oct. 8—Chas. Y. Knight, inventor of the Knight valveless engine, reached America last week after an extended trip to Europe. He will spend 4 or 5 weeks here in the interests of his motor.

NEW YORK CITY, Oct. 8.—H. A. Lozier, vice-president and manager of the Lozier Motor Co., Detroit, Mich., sailed yesterday for Europe on an extended trip to look for European accessories suited for the American market and will attend the Olympic and Paris shows.

DETROIT, MICH., Oct. 7—Geo. J. Wahl, head of the Wahl Motor Car Co. recently formed in this city to manufacture a medium-priced roadster and touring car, committed suicide at his home in this city last night. Business worry is given as the cause.

August Exports 2,004 Cars

WASHINGTON, D. C., Oct. 8—*Special Telegram*—Two thousand and four motor cars, valued at $1,983,749, were exported during August as against 1,321, valued at $1,395,599 shipped abroad during August a year ago. For the 8 months period ending with August the exports were 16,816 cars valued at $16,813,771 in 1912 and 19,194 cars valued at $19,744,482 in 1913.

Syndicate Did Not Sell 20 Per Cent. of Maxwell Stock Before Agreement Expired

NEW YORK CITY, Oct. 8—The underwriting syndicate which took over the stock of the Maxwell Motor Co. did not sell 20 per cent. of the shares before the syndicate agreement expired October 1. The underwriters had to take up about 80 per cent. or $4,576,796 of the $5,720,996 subscribed. The balance represents the total assessment of $24 per share which was paid by stockholders of the old United States Motor Co., who came into the reorganization.

The Maxwell company stocks, therefore, or rather the voting trust certificates representing the shares, are for the most part in the hands of the underwriting syndicate which consisted of Hallgarten & Co. and others. The shares are held for 5 years by Harry Bronner, Charles H. Sabin and James C. Brady. President Walter E. Flanders, of the Maxwell company, believes that the dividend on the first preferred stock will be earned this year with some surplus besides on the second preferred.

No More Grade Crossings

Illinois Railroad Men Take Action at Conference with Governor—To Co-Operate With Public Utilities Commission

SPRINGFIELD, ILL.—Motorists of Illinois may now rejoice. The grade crossing evil is to be eliminated in this state. This was the decision reached today at a conference in which presidents or direct representatives of fifteen railroads and interurban systems and Governor Dunne and other members of the state administration participated.

The railroads promised to co-operate with the state administration, to be represented by the public utilities commission, to eliminate hog backs and oblique railroad crossings as far as possible. Each of the railroads represented at the conference agreed to furnish Governor Dunne with the list of the crossings where there is believed to be existing danger of accidents.

Wisconsin Gains 10,000 Cars

MADISON, WIS., Oct. 4—Wisconsin's motor car registration up to October 1, 1913, was 34,375, a gain of approximately 10,000 cars as compared with the year 1912. It is estimated that there will be more than 35,500 cars registered before the close of the year. The gain of 10,000 is the most remarkable since the motor car was first introduced to Wisconsin. The motorcycle registration on Oct. 1 was 6,050. The Secretary of State, who is in charge of licensing and registration in Wisconsin, estimates the value of all motor cars owned in the state to be in excess of $42,000,000.

Mercer Brings Out New Limousine

TRENTON, N. J., Oct. 4—The Mercer Automobile Co. has brought out a new limousine designed to meet the demand for a light closed car suitable for both town work and touring. The new model is called 35 E. It accommodates four passengers, facing each other, the forward seat being arranged to fold up out of sight. The body is very low, a pedestrian on the sidewalk being able to look over the roof when the car is standing at the curb. The interior is trimmed in dark broadcloth and the equipment includes all the toilet articles which have come to be a part of the closed car. The body is mounted on the 35G-H Mercer chassis, which is rated at 35 horsepower having a T-head, 4.5 by 5-inch motor. Spare tires are carried at the rear, leaving the running boards clear.

U. S. Army Tests Jeffery Truck

CHICAGO, ILL., Oct. 8—A 100-mile test of the Jeffery four-wheel-drive truck, built to meet the requirements of the United States Army, has just been completed by an official of the Quartermaster Corps. The actual distance covered was 101.2 miles, and the route was through a rolling country with several bad hills. The roads were of dirt, sand and black mud, made heavy and slippery by constant rain. The actual running time was 9 hours and 10 minutes, the average speed 11.8 miles per hour, the last 44 miles being covered after dark. The gas consumed was 19.5 gallons, oil 2 quarts, water 2 quarts and the grades negotiated ranged from 9 to 20 per cent.

S. A. E. Winter Program

NEW YORK, Oct. 8—At today's meeting of the Council of the Society of Automobile Engineers the rough draft of program for the January session of the Society to be held in this city was adopted. The session will continue from Sunday, January 4, until Thursday, January 8. In drafting the program the effort has been made to make it possible for engineers to spend considerable time at the automobile show which will be held in the Grand Central Palace, the same week. To do this, the professional sessions will be held in an auditorium in the same building and the professional sessions will be shorter than usual.

The program is as follows:

Sunday, January 4, a social gathering of the members in the afternoon at the Manhattan Automobile Club.

Monday, January 5, 10 a. m., meeting of Standards Committee at the S. A. E. headquarters.

Tuesday, January 6, professional sessions in morning, afternoon and evening, the morning session including the business meeting, election of officers, etc.

Wednesday, January 7, no sessions.

Thursday, January 8, professional sessions morning and afternoon at Grand Central Palace and banquet in the evening at a New York hotel to be decided later.

It is expected that with shorter professional sessions and a definite time schedule for each session that it will be possible for engineers to follow the program and have an opportunity of spending all the necessary time at the Show.

Fox Enters 500-Mile Race Again

INDIANAPOLIS, IND., Oct. 8—Frank P. Fox, of Indianapolis, has entered his Gray Fox in the Indianapolis 500-mile race for 1914. He has improved his car considerably, the chief alteration being the enlargement of the motor from 389.9 to 431.9 cubic inches displacement by boring out the cylinders.

TACOMA, WASH., Oct. 4—Directors of the Western Automobile Assn. elected the following officers: Frank A. Garbutt, president; P. H. Greer, second vice-president; John S. Mitchell, first vice-president; Frank W. Young, third vice-president; Earl Y. Boothe, secretary; W. E. Bush, treasurer.

NEW YORK CITY, Oct. 8—The United States Rubber Co. has declared the regular quarterly dividend of 1 1-4 per cent. payable October 20, to stockholders of record October 9.

NEW YORK CITY, Oct. 5—The Lee Tire and Rubber Co., has declared a quarterly dividend of 1¾ per cent., payable on October 10.

NIAGARA FALLS, N. Y., Oct. 7—The U-S-L electric starter and lighter has been adopted by the Sheffield Motor Works, Ltd., England, manufacturers of the Sheffield-Simplex car.

Twenty Operations Required To Make Knight Motor Sleeve

(*Continued from page 649.*)

most impossible to make a mistake in cutting. The connecting rod lugs machined in the previous operation are the means of setting the sleeve on the face-plate. This face-plate is of the rotating type, provided with accurately set stops which determine the length of the port cut by the milling tool. It will be understood that the revolving milling tool occupies a fixed position while the sleeve slowly rotates. The operation is started on an absolutely plain surface. No marking is necessary, the face-plate action deciding the length of the port, as explained, while a micrometer hand wheel on the elevator screw fixes the height above the base. The milling tool is provided with a drill point for entering, thus combining the two functions in a single tool. A peculiarity of the revolving face-plate is that it does not turn on a center coincident with the axis of the sleeve, but on a point several inches behind. This is so that the ends of the posts shall be tapered. In the next machine a corresponding bevel is made along the edges of the port.

It will be noticed in Fig. 1 that a large funneled pipe rests on the top of the sleeve during the milling process. This is provided at the top with a universal joint and is in connection with a suction machine which draws up all milling dust formed within the sleeve. The air draught also has a desirable cooling effect. Spiral oil grooves are next cut in the surface for lubrication purposes. The sleeve is then placed in a jig and the connecting-rod pin hole drilled, after which there remains only the final internal and external grinding and the hand reaming of the connecting rod pin hole. A final inspection is then made and the parts passed into the stock room to be withdrawn as the engine orders go through.

Sunbeam Goes 1,078 Miles in 12 Hours

Establishes World's Record, Averaging 90 Miles Per Hour at Brooklands—Slow Time in Gaillon Hill-Climb—Vanderbilt and Grand Prize Races Off —De Palma Stars at Trenton—Tacoma to Build Speedway

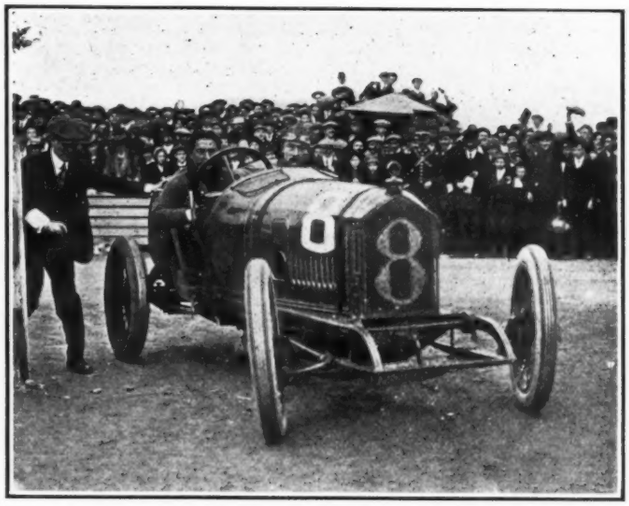
LONDON, ENG., Oct. 1—*Special Cable*—Brooklands, the fastest of all world's speedways, was the scene of another record-breaking achievement today when a 30-horsepower Sunbeam established a new 12-hour record of 1,078 miles 460 yards and shattered the best previous mark by approximately 164 miles. Three drivers shared the honor of the achievement as Lee Guinness, Resta and Chassagne each took turns at the wheel.

The average speed of the Sunbeam, which is a six-cylinder model with a bore of 3.2 inches and a stroke of 5.98 inches, was 89.91 miles an hour.

Before today's sensational drive, the Argyll held the 12-hour record which was established May 27 when W. G. Scott and L. G. Hornsted covered 914 miles 640 yards at an average speed of 76.2 miles an hour. The Sunbeam formerly held the record, R. F. L. Crossman, who rode with Guyot in the 500-mile race at Indianapolis Memorial Day, covering 912 miles 1,738 yards with a 15.9 horsepower car September 21, 1912.

The speed of the Sunbeam in today's 12-hour trial can be realized better when it is compared with the speed sustained by the Napier, holder of the 24-hour record established by Edge in 1907 and never eclipsed. In twice the running time of the Sunbeam, the 60-horsepower Napier traveled only 503 miles more.

This has been a season of record-breaking at Brooklands. In addition to two 12-hour records broken, two cars have crowded more than 100 miles within an hour. In February, a Talbot, driven by Percy Lambert, traveled 103 miles 1,470 yards in 60 minutes, and in April, Goux's Peugeot went 106 miles, 387 yards in the same time.



Boillot in the Peugeot with which he won the Boulogne 3-liter race

Gaillon Hill-Climb Won by Crespelle at Only 62.21 Miles Per Hour

PARIS, FRANCE, Oct. 6—*Special Cable*—The classic Gaillon hill-climb, at Berbe, was won by a Crespelle machine in the slow time of 35 seconds for the kilometer, a speed of 62.21 miles per hour. Last year Fritz Erle's Benz negotiated the 9 per cent. gradient at the record speed of 102.5 miles per hour.

The results for the racing class were:

Car	Driver	Time	M.P.H.
Crepelle	Crespelle	35.0	63.87
Delauny	Pierron	35.3	63.33
Gregiore	Costa	36.0	62.10
Aquila Italiana	Marsaglia	41.3	54.12
Schneider	Tarsigny	42.3	52.84
Bedelia	Devaux	43.1	51.87

A Schneider, driven by Gabriel, was first in the touring car class, with an average speed of 58.37 miles per hour. The performance of the cars were as follows:

Car	Driver	Time	M.P.H.
Schneider	Gabriel	38.3	58.37
S. C. A. P.	Launay	42.0	53.22
Hispano-Suiza	Massucar	43.1	51.87
Martini	Lamberjack	43.1	51.87
Alda	Tabuteau	45.0	49.68
Buick	Repusseau	45.2	49.45
Barre	Ravaud	48.0	46.57

No Grand Prize and Vanderbilt This Year

NEW YORK CITY, Oct. 7—The Grand Prize and Vanderbilt Cup races, which were scheduled to have been conducted by the Savannah Automobile Club over its course in November, have been declared off by the Savannah Club due to lack of interest, there being but two *bona fide* entries at the expiration of the date set for closing of entries. President Harvey Granger, together with other Savannah officials, spent many days in New York endeavoring to secure entries of foreign cars but without avail.

The leading obstacle in the securing of entries was the refusal of the club to reduce the entry fee, which in case of the Grand Prize $1,000 per car, two cars for $1,500 and three cars for $1,750. In the Vanderbilt race the entry fees were: one car $500, two cars $750 and three cars $1,000. In the Savannah Challenge Trophy race the entry fees were: one car $250, two cars $400 and three cars $500. These entry fees were particularly high considering the prize money, for in the Grand Prize a single entrant would pay $1,000, and the first prize money was but $3,500. In the Vanderbilt with an entry fee of $500 the cash winnings for the victor were but $2,000.

The makers concluded that they would not enter unless some inducements similar to those offered at Elgin were given, in which the entry fee was refunded in case a car started. Nothing definite is known yet as to whether the Motor Cups Holding Association, which has the possession of the two trophies, namely the Grand Prize and the Vanderbilt Cup, will withdraw these cups from further contest this year or not.

Much criticism of the Savannah officials has arisen due to their dubbing the Indianapolis and Elgin races as hippodrome events, whereas both events were of the highest type of keenly contested races. President Granger's remarks on both Indianapolis and Elgin commercializing racing have not made any friends for the Savannah people because it is a well-known fact that the races were put on at Savannah for purely commercial reasons, namely, to boom the city and that territory. In view of this it would seem that more real sportsmanship has been shown in the Elgin and Indianapolis races than at Savannah.

Austrian Cyclecars Climb Semmering Pass

VIENNA, AUSTRIA, Sept. 28—The first important cyclecar event held in Austria took place at the celebrated Semmering pass recently. Cars of both the true cyclecar type and the small automobile were represented, although the former were in the majority. The contest was divided into two classes: the horsepower limit being 7 in the smaller and 12 in the larger. The Globe-Anzani was victorious in the 7-horsepower class, doing the 10 kilometers in 13:17.8, or at the rate of 28.15 miles per hour. The Phaenomobil distanced the field in the contest for 12-horsepower machines. Its time was 12:39.4, or an average speed of 29.60 miles per hour.

De Palma Stars at Trenton

TRENTON, N. J., Oct. 4—The automobile events scheduled for yesterday at the Interstate Fair were held over until today on

account of a heavy track and formed a feature of getaway day of the Fair.

While no records were endangered, the seven events carded were run in good time and were productive of noisy demonstrations. The names of the drivers entered were the magnets that attracted an immense crowd.

The racing was held over a half-mile track. Summaries:

5 MILES, CLASS C, NON-STOCK

Car	Driver	Time
Roberts	Roberts	7:39.75
Ford	Longstreth	
Hudson	Tams	

10 MILES, CLASS E, NON-STOCK

Car	Driver	Time
Mercer	De Palma	13:24
Mercer	Wishart	
Mercer	Pullen	

5 MILES, CLASS E, NON-STOCK

Car	Driver	Time
Mercer	De Palma	6:27
Mercer	Wishart	
Mercer	Pullen	

EXHIBITION TIME TRIALS, MILE, FLYING START

Car	Driver	Time
Mercer	Wishart	1:14.25
Mercer	Huchman	
Lozier	Applegate	

10 MILES, CLASS D, NON-STOCK, FREE-FOR ALL

Car	Driver	Time
Mercer	De Palma	13:10.75
Mercer	Wishart	
Lozier	Applegate	

CLASS E, PURSUIT RACE

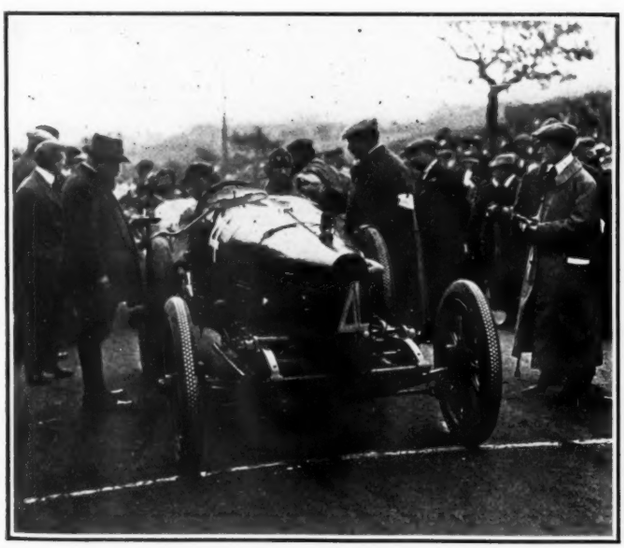
Distance limited to 10 miles. Field comprised three Mercers, Lozier, Buick and Roberts Special —Mercer, Wishart driving, won.

10 MILES, CLASS E, FREE-FOR-ALL HANDICAP

Car	Driver	Time
Roberts	Roberts	13:58.75
Mercer	Pullen	
Buick	Haupt	

$100,000 Speedway for Tacoma

TACOMA, WASH., Oct. 4—Adoption of a course inside the present road course for the construction of a model automobile speedway to cost when completed approximately $100,000, marked a session of the board of directors of the Tacoma Carnival Association September 29th. A stock company will be formed of a semi-public character, to be known as Tacoma Speedway Assn., which will construct the 2-mile track for next summer's events and direct contest under A. A. A., sanction.



Guinness's Sunbeam, the only car to cover the Boulogne course without a stop

France To Have 152-Cu. In. Race in 1914

Boillot Wins at Boulogne

BOULOGNE, FRANCE, Sept. 21—Today's race of 388 miles over the Boulogne circuit for 3-liter cars, that is, a displacement of 183 cubic inches, which race was captured by the Baby Peugeot as reported by cable in THE AUTOMOBILE for September 25, will in all probability be the last 3-liter race in France. For next year the piston displacement has been cut to 152 cubic inches, and the maximum weight of the cars has also been reduced from 1,980 pounds to 1,873 pounds. In a word, French manufacturers are more determined than ever that the small car is the winner and it is not a wide jump of the imagination to see the day when piston displacement will be still further reduced.

Boillot, the winner, demonstrated today how it is possible with a little car of 3.07 by 6.14 inches to average 63.2 miles an hour for the entire distance with a Peugeot and his team mate Goux showed how these little cars can average 65.5 miles per hour for circuits of the course measuring 32 miles.

Before the start it was certain that many of the entrants started with the sole determination of going the entire distance without a stop. For this purpose the Peugeot entries carried 22 gallons of gasoline each. Sunbeams were prepared to go the entire distance, but the Vauxhall arranged to take on gasoline at the half-way point.

Wire wheels were used on all cars and tire troubles were remarkably few considering the severity of the course.

In preparing for this race Peugeot built three cars on the same general lines as the big racers seen in the French grand prix and at Indianapolis. The motor is a four-cylinder monoblock of 78 by 156 millimeters bore and stroke with sixteen valves in the head operated from two independent camshafts driven by a train of gears at the front. The lubrication is the same as that on the big cars, a large quantity of oil being carried in a tank within the frame, delivered by means of low pressure through the sight feeds to the three main ball bearings, through the hollow shaft to the connecting-rod ends and the excess pumped back from the base chamber to the main tank. When the base chamber is free of oil, the pump delivers air to the main tank. The motor and gearbox, forming separate units with a universal joint between them, are mounted on a three-point suspended subframe with trunnion connections to the main frame.

Little can be judged regarding the weak points of these small cars from today's race, even the troubles which eliminated some of them not being conclusive enough to demonstrate weaknesses in these cars. There were cases of cracked cylinders and broken axles as well as gasoline pipes cracking, but otherwise few serious mechanical difficulties were experienced.

The fuel consumption was not so high as was expected. Boillot used approximately 19 gallons of gasoline and averaged 20.4 miles to the gallon.

The only car to go through the entire race of 388 miles without a stop of any nature was the Sunbeam driven by Guinness.

The accompanying table of specifications of the contesting cars shows that one-third of the cars used a 2-to-1 stroke bore ratio, namely 78 by 156 millimeters, or, in inches, 3.07 by 6.14. These motor sizes were used by three Peugeots, two Zenias and the Anasagasti from Argentine, South America.

The Sunbeams, representing England, used 80 by 148 millimeter motors, or 3.14 by 5.82 inches bore and stroke, a stroke-bore ratio of 1.8 to 1. These finished next to the Peugeots.

SPECIFICATIONS OF CARS PARTICIPATING IN THE RECENT 3-LITER RACE AT BOULOGNE, FRANCE

Car	Driver	Country	Bore and Stroke	Bore and Stroke, Inches	No. of Speeds	Cooling	Carbureter	Magneto	Wheels	Clutches
Zenia	Guyot	France	78 x 156	3.07 x 6.14	4	Pump	Claudel	Bosch	Rudge-Whitworth	Disk
Anasagasti	D'Avaray	Argentine	78 x 156	3.07 x 6.14	4	Pump	Claudel	Bosch	Faure	Disk
Vauxhall	Hancock	England	90 x 118	3.54 x 4.64	4	Pump	Claudel	Bosch	Rudge-Whitworth	Disk
Sunbeam	Chassagne	England	80 x 148	3.14 x 5.82	4	Pump	Claudel	Bosch	Goodyear	Cone
Buick	Depusseau	United States	98 x 95	3.85 x 3.74	3	Pump	Claudel	Bosch	Faure	Cone
Peugeot	Boillot	France	78 x 156	3.07 x 6.14	4	Pump	Claudel	Mea	Rudge-Whitworth	Cone
F.A.B.	Loschi	Belgium	82 x 140	3.22 x 5.51	4	Thermo	Zenith	Bosch	Rudge-Whitworth	Cone
Alda	Tabuteau	France	82 x 140	3.22 x 5.51	4	Thermo	Claudel	Bosch	Dunlop	Cone
Zenia	Briard	France	78 x 156	3.07 x 6.14	4	Pump	Claudel	Bosch	Rudge-Whitworth	Disk
Vauxhall	Watson	England	90 x 118	3.54 x 4.64	4	Pump	Claudel	Bosch	Rudge-Whitworth	Disk
Sunbeam	Resta	England	80 x 148	3.14 x 5.82	4	Pump	Claudel	Bosch	Goodyear	Cone
Buick	Drouillet	United States	98 x 95	3.85 x 3.74	3	Pump	Claudel	Bosch	Faure	Cone
Peugeot	Goux	France	78 x 156	3.07 x 6.14	4	Pump	Claudel	Mea	Rudge-Whitworth	Cone
F.A.B.	Coosemans	Belgium	82 x 140	3.22 x 5.51	4	Thermo	Zenith	Bosch	Rudge-Whitworth	Cone
Alda	Petit	France	82 x 140	3.22 x 5.51	4	Thermo	Claudel	Bosch	Dunlop	Cone
Sunbeam	Lee Guinness	England	80 x 148	3.14 x 5.82	4	Pump	Claudel	Bosch	Goodyear	Cone
Peugeot	Rigal	France	78 x 156	3.07 x 6.14	4	Pump	Claudel	Mea	Rudge-Whitworth	Cone

VANCOUVER'S New Rubber Plant—Vancouver is to have a new industry in the form of a rubber manufacturing plant. It is proposed to manufacture all kinds of articles—from rubber boots to automobile tires. The investment is likely to amount to several hundred thousand dollars, and when the plant is in operation over 500 workmen will be employed. It is stated that the new concern is being financed by the Canadian Rubber Co., of Montreal, a concern which practically controls the rubber business in the Dominion.

Page Co. Building Windshields—The Page Wire Fence Co., Adrian, Mich., has begun the manufacture of windshields for automobiles.

Nyberg to Enlarge—Henry Nyberg, Chattanooga, Tenn., the automobile manufacturer, is planning to increase the capital stock of his company and enlarge the plant.

Rochester Concern Enlarges—The Miller Planing Mill Co.'s plant in Rochester, N. Y., has been absorbed by the Gibson Motor Co. Dr. Charles E. Gibson is one of the leading promoters.

Kalamazoo Equipping New Plant—The Kalamazoo Motor Vehicle Co., Kalamazoo, Mich., is being established by F. G. Clark and others and is equipping a plant. The new company is capitalized for $35,000.

Hatfield Truck May Move—The Hatfield Truck Co., Elmira, N. Y., is considering moving its plant to Williamsport, Pa., as a large part of the stock has been purchased by business men of the latter city.

Body Hardware Co. Builds—The Joseph Smith Mfg. Co., Detroit, Mich., manufacturer of automobile body hardware, is contemplating the erection of a $75,000 plant, a site for which has been purchased at a cost of about $20,000.

Canadian Kelly-Springfield Co.—Negotiations are being made for the establishment of a factory at Vancouver, B. C., by the Kelly-Springfield Tire Co. The plant will be located on the north arm of the Fraser River, near Main street.

Packard Building in New York—The Packard Motor Co., New York City, will erect a one-story addition to its service station on Hill street, near Queens Boulevard. The new structure will be of brick and concrete, 227 by 89 feet, and will cost about $40,000.

Toledo Bearings Firm Builds—A $25,000 factory building is to be erected in Toledo, O., at the intersection of Phillips avenue and the Michigan Central tracks for W. E. Bock, manufacturer of automobile and other machine bearings. The dimensions of the building will be 225 by 60 feet.

Champion Spark Plug Builds—A permit has been granted for the erection of a new factory building for the Champion Spark Plug Co., Toledo, O., at Avondale and Upton avenues, to cost $24,000. The building will be four-story, concrete, with steel sash and daylight effects and will have a ground space 60 x 120 feet.

Universal Truck's Highland Plant—At a recent meeting of the stockholders of the Highland Water Co., Highland, Ill., a resolution was passed which empowers the board of directors to negotiate for the sale of 10 acres of land to the Universal Motor Truck Co. for a site for a factory it proposes to erect in that city.

Dominion Tire Plant Finished—The plant of the Dominion Tire Co., Ltd., a subsidiary of the Canadian Consolidated Rubber Co., has been completed and machinery and other equipment are now being installed. Officials of the company state that the plant will be in operation within a few weeks. The factory is said to be very complete and to have cost approximately $600,000.

Ajax Building Nearly 800 Tires Daily—Production of the Ajax-Grieb Rubber Co., Trenton, is fast approaching 800 tires a day. In the past 12 months the company has increased its force from 350 to 400 men, and in a very short time will take on fifty more men. Extra machinery, involving considerable expense, is being installed with a view to bringing 800 tires a day well within the limit of the production of the operatives.

Shaler Expands—The C. A. Shaler Co., Waupun, Wis., manufacturer of Shaler vulcanizing devices, has broken ground for a three-story addition which will practically double its manufacturing capacity. The old plant, which was built in 1911, has proved inadequate. The new building will be devoted to the manufacture of the garage steam vulcanizer which the company put on the market abut a year ago.

Continental Centralizes—The Continental Engine Mfg. Co. has located in Minneapolis in order to combine its interests and handle everything from that point. The purpose is to run three independent factories, one for cyclecars, one for the manufacture of automobile and marine engines and the other for the manufacture of a large touring roadster, especially designed for cross-country work and particularly for the Western country.

New Plant for Walkerville—Another manufacturer of automobiles has found it advisable to open a factory on the Canadian side of the Detroit River. The new company will be styled the Fisher Automobile Co., with Frank Fisher as president and general manager. Mr. Fisher was formerly general manager of the Walkerville branch of the Studebaker Corp., and has purchased the Tudhope Automobile Co., of Orillia, in Simcoe County, Ont., preparatory to moving the equipment to Walkerville. The company expects to begin active manufacturing by January 1, 1914.

Stoddard to Manufacture Tires—The first factory making automobile tires to start operations in Worcester, Mass., began the manufacture of tires recently when Charles H. Stoddard began producing what will be known as the Stoddard tires. He has his factory at Exchange and Commercial streets. The production at first will be small compared to what other factories are doing, but he hopes to increase it to a good figure within a short time. For several years Mr. Stoddard has been in the tire business and he served through all the grades, spending some time at one of the Akron factories.

The Automobile Calendar

Shows, Conventions, Etc.

Oct. 13	Philadelphia, Pa., National Fire Prevention Conference. Philadelphia Fire Prevention Commission.
Oct. 14	Chicago, Ill., Electric Vehicle Assn. of America, Fourth Annual Convention, Hotel La Salle.
Oct. 25	New York City, Electrical Exposition Motor Show, Grand Central Palace.
Oct. 27-28	Chicago, Ill., Fourth Annual Convention, Electric Vehicle Assn. of America.
Nov. 8-15	Atlanta, Ga., Show, Atlanta Automobile & Accessory Assn.
Dec. 9-12	Philadelphia, Pa., Annual Convention of American Road Builders' Association.
Dec. 11-20	New York City, First International Exposition of Safety and Sanitation, under the auspices of the American Museum of Safety.
Jan 2-10, 1914	New York City, Importers' Automobile Show, Hotel Astor.
Jan. 3-10, 1914	New York City, Automobile Show, Grand Central Palace.
Jan. 24-31, 1914	Chicago, Ill., Automobile Show, Coliseum and First Regiment Armory.
Jan. 26-31, 1914	Scranton, Pa., Automobile Show, Automobile Assn. of Scranton.
Jan. 31-Feb. 7, 1914	Minneapolis, Minn., Automobile Show.
Feb. 2-7	Buffalo, N. Y., Automobile Show, Buffalo Automobile Dealers'
Feb. 9-14	Buffalo, N. Y., Truck Show, Buffalo Automobile Dealers' Assn.
Feb. 21-28	Newark, N. J., Automobile Show, N. J., Auto Trade Assn.
Feb. 22-27	Omaha, Neb., Automobile Show, Omaha Automobile Assn.
Feb. 22-March 5	Cincinnati, O., Automobile Show, Cincinnati Automobile Dealers' Assn.
Mar. 9-14	Des Moines, Ia., Show, Des Moines Automobile Dealers' Assn.

Race Meets, Runs, Hill Climbs, Etc.

Oct. 11	Springfield, Ill., Track Race, State Board of Agriculture.
Oct. 11	Hanford, Cal., Road Race, Kings Co. Auto Club.
Nov. 3	Los Angeles, Cal., Road Race to Phoenix, Ariz.
Nov. 6	Phoenix, Ariz., Track Meeting, State Fair.

Foreign

Oct. 17-28	Paris, France, Automobile Show, Grand Palais, 10 days.
Nov. 7-15	London, Eng., Annual Automobile Exhibition, Olympia.

The Week in the Industry

Motor Men in New Roles

DUCK with Locomobile Branch—George H. Duck has become allied with the New York City branch of the Locomobile Co. of America. He has assumed charge of the truck department of the local establishment.

Udale with Tracy—S. M. Udale has joined Joseph Tracy in the latter's testing and laboratory work and will be in charge of the New Jersey plant.

Miller Goodyear's Spokane Manager—C. C. Miller has been promoted to manager of the Spokane, Wash., branch of the Goodyear Tire & Rubber Co.

Tyner Joins Wahl—A. W. Tyner has associated himself with E. B. Stimson, Minneapolis, Minn., in the management of the Wahl territory in the Northwest.

Cornell with Splitdorf—Fred. A. Cornell has joined the selling force of the Splitdorf Co., Newark, N. J. He comes from the selling staff of the Timken Roller Bearing Co.

F. R. Pendleton Changes—F. R. Pendleton, formerly with General Motors, has gone with the Commerce Motor Car Co., Detroit, Mich., to act as Eastern sales representative.

Van Harlingen Opens Office—J. M. Van Harlingen announces that he has opened an office for the practice of transportation engineering at 149 Broadway, New York City.

Burman Goes to California—C. H. Burman has severed his connection with the Vancouver Island Motor Co., Victoria, B. C., to take charge of the H. O. Harrison Co., Oakland, Cal.

Brady in Milwaukee—E. C. Brady has been made manager of the Cole Motor Co.'s branch in Milwaukee, Wis. He succeeds W. J. Haughey, who has gone to Denver with a large motor car concern.

Cummings Sales Manager—Herbert Seller, distributor of Mack and Sauer trucks in northern California, has recently been joined by C. S. Cummings, formerly of Vancouver, B. C. He will have full charge of the sales and service end.

Wright Succeeds Hicks in Montreal—Mr. Wright, formerly of the Motor Import Co., has joined the Montreal, Que., branch of the Russel Motor Car Co. as salesman. He takes the place of William Hicks, who has accepted a position with the Comet Motor Co.

Garage and Dealers' Field

WESTERN Canada Tries Co-operative Buying—The Cooperative Supply Co., Ltd., opened up for business recently in Winnipeg and Saskatoon. It states that branches will be established at all important points in the Canadian North-West. The method of doing business is on the share principle, shareholders being allowed liberal discounts. The manager is L. K. Hacking.

Gibney Tire's New Branch—The Gibney Tire & Rubber Company has opened a branch on Brookline street, Boston, Mass.

Logan Vancouver Case Agent—Mr. Logan, manager of the Maritime Motor Co., Vancouver, B. C., has obtained the Case agency.

Dency Tire Pumps in Vancouver—The Steel Protector & Auto Tire Co., of Vancouver, B. C., has taken the agency for Dency tire pumps.

Stepney Tire in Montreal—The Uptown Vulcanizing Agency, of 49 Drummond street, Montreal, Que., has taken over the agency of the Stepney tire.

Tire Co. in Moose Jaw Changes Hands—The Western Tire & Rubber Co., of West High street, Moose Jaw, Sask., Can., has been purchased by D. A. Knechtel.

Puncturefix in British Columbia—Messrs. Randall and Greenshaw, with the British Columbia Hardware Co., Fort street, Vancouver, are selling Puncturefix in that territory.

Biggam Erects Machine Shop—A machine shop for the manufacture of transmission clutches and other automobile parts is to be erected by the Biggam Engineering Co., Buffalo, N. Y.

Vancouver's American Gasoline Branch—The American Gasoline Co., Vancouver, B. C., has opened up a branch under the management of N. J. McKnight, late of the Russel Motor Co.

Stubbs Company Moves—The J. T. Stubbs Co., Rhode Island distributor for the Henderson and National cars, with headquarters at Providence, has just moved into new salesrooms, 78 Mathewson street.

Endurance Tire in Boston—The Endurance Tire & Rubber Company has opened a branch in Boston, Mass., on Boylston street, and John L. Hamilton, for 8 years with the Eagle Oil Company, is the manager.

Open Supply House—W. P. Wotton and Karl Martin, formerly connected with the Automobile Supply Company in Tacoma, have opened the Olympia Auto Supply Company at 5th and Main streets, in the capital city.

National Motor Accessories—The Russel Motor Co., of Toronto, Ont., has arranged to have the Canadian Cycle & Motor Co., Ltd., West Toronto, take over its accessory business known as the National Motor Accessories.

Indianapolis Hupmobile Co. Moves—The Hearsey-Willis Co., Indianapolis, Ind., agent for the Hupmobile, has moved into a new three-story building in Motor Row, the last motor company to leave the downtown retail district.

Regal Agent Will Build—Plans are being prepared for a two-story salesroom and office building for the Ohio Auto Sales Co., to be erected on North High street, near Warren street, Columbus, O. The company is central Ohio agent for the Regal.

Isotta Co. Leases—The Isotta Automobile Co., New York City, recently leased a store in the Fifty-seventh street side of the three-story building now being constructed on the site of the one-time Whitney residence, at the south west corner of Fifth avenue and Fifty-seventh street.

Bus Line in Tacoma—The largest automobile stage ever put into use in the Northwest was the one purchased by the Auto Interurban line near Spokane, Wash. The car is a Dorris truck and is fitted with a body that holds thirty-five passengers. The car runs between Spokane and Davenport, Wash., covering 90 miles daily.

The Canadian Motorist—The Canadian Motorist, the official organ of the Ontario Motor League, will make its appearance in January, 1914. The offices of the Canadian Motorist will be in the League office, Lumsden Building, Toronto, Ont. Hartley Robinson, formerly managing editor of Good Roads, has been appointed publication manager.

Moves to New Quarters—The Whitten-Gilmore Co., agent for the Chalmers and Woods electrics, has moved into its new Building on Commonwealth avenue, Boston, Mass., where it will occupy half the basement and first two floors and the entire third floor. The first floor will be used as a salesroom and office, the second floor for second hand cars and the third floor as a service department. The truck department will be in the basement. The other half of the building will be occupied by the Boston agency for the Franklin cars.

License Registration in Manchester—The first four months of the automobile license year shows an increase of about a thousand licenses taken out in Manitoba over the total number taken out last year. For the year 1913 the total licenses taken out was 4,375 for the province, while since April 1, the beginning of the license year, the total is 5,218. This is double the number taken out for 1911. A review of the licenses taken out this season shows that practically 12 per cent. of the total are from outside Winnipeg, Man., whereas 3 years ago it was but an occasional machine that was owned outside either Winnipeg, Brandon or Portage.

Many Motor Fire Engines in Canada—Over $250,000 has been appropriated by municipal bodies in western Canada recently for fire-fighting equipment. Motor-driven fire apparatus at present in use are: Four in Winnipeg, five in Calgary, two in Medicine Hat, one in Lethbridge, three in Vancouver and one in Prince Albert. In addition, the cities of western Canada have ordered seventeen pieces of apparatus distributed as follows: Five for Moose Jaw, four for Calgary, two for Medicine Hat, three for Edmonton and one each for Saskatoon, Battleford and Prince Albert. The apparatus includes all types of automobile fire engines.

Recent Incorporations in the Automobile Field

AUTOMOBILES AND PARTS

BROOKLYN, N. Y.—Ritz Cycle Car Co.; capital, $10,000; to repair automobiles. Incorporators: Albert T. Maurice, A. Spotswood Campbell, Daniel B. Murray.

CANAL FULTON, O.—Fulton Drop Forge Co.; capital, $100,000; to manufacture and deal in drop forgings. Incorporators: W. C. Laiblin, C. A. Irwin, H. D. Pounall, William Stuart, A. M. McCarthy.

CHICAGO, ILL.—Automobile Realization Co.; capital, $90,000; to make automobiles, automobile parts and accessories. Incorporators: Frank T. Righeimer, Mark W. Bigelow, Frank T. Murray.

CHICAGO, ILL.—Ross Sleeve Motor Co.; capital, $20,000; to deal in motors and engines. Incorporators: F. W. Lull, E. Lundblad, A. S. Lytton.

CHICAGO, ILL.—The Ziegler Co.; capital, $2,500; to deal in and repair automobiles. Incorporators: F. C. Donald, C. T. Ziegler, J. D. Ayres.

CHICAGO, ILL.—Johnson Electric Appliance Co.; capital, $25,000; to manufacture electric appliances. Incorporators: H. B. Johnson, T. B. Dockson, J. F. Williams.

COLUMBUS, O.—Ohio State Auto Association; for the mutual benefit of auto owners.

CRAWFORDSVILLE, IND.—American Motor Wheel Co.; capital, $600,000; to manufacture automobile wheels. Incorporators: W. H. Orren, S. C. Rowland, John V. Wilson.

DULUTH, MINN.—Resilient Auto Wheels Co.; capital, $50,000; to make resilient automobile wheels and other parts. Incorporators: Arthur Jutila, Elmer Johnson, Osmund Thompson, A. W. Younkvist, B. E. Wellberg.

FORT WORTH, TEX.—Chandler Motor Car Co.; capital, $5,000. Incorporators: B. K. Smith, M. H. Smith, R. E. Southern.

GIBSONBURG, ILL.—National Motor Truck & Manufacturing Co.; capital, $250,000; to manufacture trucks. Incorporators: E. C. Russel, C. H. Hutchinson, A. T. Crosset.

HEMPSTEAD, L. I.—London Limousine Co.; capital, $10,000; to manufacture detachable auto bodies. Incorporators: John McAvoy, Charles U. Stowe, Anna M. Stowe.

JEFFERSON, WIS.—Jefferson Auto Co.; capital, $6,000; to manufacture automobile parts. Incorporators: H. W. Paul, J. N. Heid, C. J. Puerner.

MARION, O.—Marion Motor Car Co.; capital, $10,000; to deal in automobiles. Incorporator: C. D. Copeland.

NEW YORK, N. Y.—The Motor Materials Co.; capital, $100,000; to manufacture and deal in gas, gasoline and electric motors.

NEW YORK, N. Y.—Stuyvesant Auto Trading Co.; capital, $25,000; to deal in automobiles. Incorporators: Simon Klein, Joseph Goldstein, Bertha Steinhardt.

NEW YORK, N. Y.—Brockway Motor Truck Sales Corporation; capital, $15,000; to deal in automobile trucks. Incorporators: Richard C. Sack, John F. Soby, Wm. N. Brockway.

ORANGE, CONN.—Cameron Mfg. Co.; capital, $1,000,000; to manufacture and deal in motor vehicles and boats. Incorporators: F. S. Corlew, T. M. Steele, H. F. Parmelee.

PITTSBURG, PA.—Williams Halsey Motor Car Co.; capital, $15,000; to deal in automobiles.

PONTIAC, MICH.—Pontiac Motor Car Co.; capital, $25,000; to manufacture automobiles and motors. Incorporators: F. J. Smith, W. H. Jenkins, H. E. Torrance.

RACINE, WIS.—Mitchell-Lewis Co. of Racine; capital, $10,000; sales organization for Mitchell-Lewis Motor Co. Incorporators: Frank L. Mitchell, William H. Armstrong.

TOLEDO, O.—The Automobile Distributing Co.; capital, $10,000; to deal in automobiles. Incorporator: W. G. Kirkbridge.

WILMINGTON, DEL.—Simplex Automobile Co.; capital, $1,500,000; to manufacture and deal in automobile trucks and pleasure cars.

GARAGES AND ACCESSORIES

BROOKLYN, N. Y.—Safety Rubber Tire Co., Inc.; capital, $500; to manufacture and deal in all kinds of rubber tires. Incorporators: Frank Kronenberg, Minnie E. Kronenberg, William Kronenberg.

CENTRALIA, ILL.—Centralia Garage and Vulcanizing Co.; capital, $2,500; to do general garage business. Incorporators: L. H. Jones, M. Allan Copple, R. Ray Copple, G. C. Armstrong, J. W. Armstrong.

CHICAGO, ILL.—Patterson Garage Co.; capital, $4,500; to do general garage business. Incorporators: Richard F. Patterson, William Frank Daly, Marshall E. Gallion.

CHICAGO, ILL.—Rail and Auto Sundries Co.; capital, $5,000; to deal in automobile accessories. Incorporators: William W. Bishop, Raphael B. Jamison, William J. Anderson.

CHICAGO, ILL.—Universal Auto Supply Manufacturing Co.; capital, $50,000; to manufacture supplies. Incorporators: C. S. Tuttle, G. Burke, Joseph D. Iroz.

CINCINNATI, O.—Christian County-Ideal Motor Co.; capital, $4,000; general garage business. Incorporators: J. W. Petrie, Charles R. Lewis, F. H. Ritter.

CLEVELAND, O.—Cleveland Motor Lamp and Radiator Co.; capital, $10,000; to deal in automobile accessories of all kinds. Incorporators: W. H. Monte, J. L. Balash, E. E. Kiesler, H. J. Monson, W. Louis Ross.

EDWARDSVILLE, ILL.—Edwardsville Garage and Auto Supply Co.; capital, $10,000; to do general garage business. Incorporators: Thomas J. Fahnestock, Olin Giese, Walter P. Kriege.

FLORESVILLE, TEX.—M. A. Newman Garage Co.; capital, $5,000; general garage business. Incorporators: J. E. Dewees, M. A. Newman, J. H. Brown.

GALVESTON, TEX.—Automobile Sales Co.; capital, $5,000; to conduct a garage and agency business. Incorporators: L. P. Tschumy, C. F. Webber, L. H. Newman.

GREEN BAY, WIS.—The Green Bay Oil and Gas Co.; capital, $30,000. Incorporators: T. D. Silverwood, John Fredericsen, George Snavely.

NEW YORK, N. Y.—S. and K. Tire Co.; capital, $10,000.; to manufacture and deal in automobile tires. Incorporators: Herman Senner, Bernard S. Kaplan, Jas. J. Coomer.

NEW YORK, N. Y.—Gasoline and Oil Supply Co.; capital, $10,000; to deal in gasoline and oil. Incorporators: James M. Pugh, John H. Story, Walter W. Friend.

NEW YORK, N. Y.—Bayart and Messart Company; capital, $5,000; to conduct general garage business: Incorporators; John O. Oldmixon, Eugene Mesnard, Charles Bayart.

PHILADELPHIA, PA.—Quality Rubber and Auto Supply Co.; capital, $25,000; to manufacture and sell automobile tires. Incorporators: F. R. Hansell, George H. B. Martin, S. C. Seymour.

PHILADELPHIA, PA.—Mecca Tire Co.; capital, $100,000; to manufacture and deal in rubber goods.

POUGHKEEPSIE, N. Y.—Warm Hand Steering Wheel Corporation; capital, $150,000. Incorporators: Grant E. Smith, Walter S. Barton, Josiah C. Barton.

RICHMOND, N. Y.—Richmond Auto Polo Club; capital, $2,000; to promote auto polo. Incorporators: John Milnes, Charles B. Dullea, Martin H. Hanson.

SALEM, MASS.—Loring Avenue Garage Co.; capital, $5,000; to conduct a general garage and repair business. Incorporators: George H. Brooke, George P. Brookes, Ashley R. Slee.

SAN ANGELO, TEX.—San Angelo Motor Club; no capital. Incorporators: C. R. Webb, H. E. Jackson, A. B. Sherwood.

STATESVILLE, N. C.—Carolina Motor Company; capital, $25,000; to do general garage business. Incorporators: S. B. Miller, G. L. McKnight, H. H. Yount.

ST. LOUIS, MO.—Sharkey Undertaking and Automobile Co.; capital, $4,520; to do automobile livery business. Incorporators: John T. Sharkey, L. Sharkey, H. Sharkey.

ST. LOUIS, MO.—Motors Realty and Investment Co.; capital, $2,000. Incorporators: A. J. Lindsay, A. J. Sual, Bryan M. Taylor.

WAUWATOSA, WIS.—Suburban Garage Co.; capital, $11,000; garage and repair business. Incorporators: A. D. Warren, P. G. Warren, D. A. Krienitz.

YONKERS, N. Y.—Colonial Garage Co.; capital, $10,000; to do general garage business. Incorporators: George H. Mills, F. H. Jones, Charles Smith.

CHANGES OF NAME AND CAPITAL

CHICAGO, ILL.—Armac Motor Co.; capital increased from $75,000 to $105,000. Name changed to Allied Motors Corporation.

CLEVELAND, O.—A. R. Davis Motor Co. increases capital from $10,000 to $50,000.

COLUMBUS, O.—John W. Brown Mfg. Co.; capital increased from $490,000 to $600,000; manufacturer of lamps.

New Agencies Established During the Week

PASSENGER VEHICLES

Place	Car	Agent
Allentown, Pa.	Oldsmobile	Berwin Auto Co.
Asbury Park, N. J.	Haynes	H. R. Ingalls
Birmingham, Ala.	Oldsmobile	Highland Garage
Brooklyn, N. Y.	Haynes	I. C. Kirkham
Canton, O.	Chalmers	Al Shem
Clinton, Iowa	Haynes	Model Auto Co.
Chicago, Ill.	Oakland	R. A. Wadsworth & Co.
Chicago Junction, O.	Oakland	Mehring & Beelman
Columbus, O.	Jackson	J. E. Lawrence
Columbus, O.	Locomobile	The Engle and Vincent Automobile Co.
Crookston, Minn.	Oldsmobile	Crookston Garage
Dallas, Tex.	Marathon	Tri-State Sales Co.
Decatur, Ill.	Haynes	James G. Parker
Denver, Col.	Franklin	Colorado Motor Car Co.
Dixon, Ill.	Oakland	Moeller & Wilson
Duluth, Minn.	Oakland	E. H. Whitney
Hartford, Conn.	Oldsmobile	Palace Automobile Station
Hazlehurst, Miss.	Ford	J. P. Wise Mercantile Co.
Hazlehurst, Miss.	Haynes	B. F. Johnson
Huntington, W. Va.	Oldsmobile	H. E. Love
Lima, O.	Hudson	Central Garage
Lincoln, Ill.	Oldsmobile	The Wasson Co.
London, O.	Metz	S. R. Fricker
Marion, O.	Cole	Gunder and Miller
Melvin, Ill.	Oldsmobile	N. H. Boshell
Meridian, Miss.	Oldsmobile	Edwin S. Curtice
Milwaukee, Wis.	Detroit Electric	Jesse A. Smith Auto Co.
Milwaukee, Wis.	Empire	Schwarzburg-Mack Auto Co.
Milwaukee, Wis.	King	Schwarzburg-Mack Auto Co.
Milwaukee, Wis.	Oakland	Schwarzburg-Mack Auto Co.
Milwaukee, Wis.	Paige	R. D. Rockstead
Montreal, Que.	Haynes	Charette Bros.
New York, N. Y.	Oldsmobile	The Cutting-Larson Auto Co.
Oil City, Pa.	Oldsmobile	C. H. Weaver
Philadelphia, Pa.	Cole	Automobile Co. of Philadelphia
Phoenix, Ariz.	Stutz	Jack Holmes
Port Arthur, Ont.	Oldsmobile	A. J. Carrick
Salem, Ind.	Oakland	J. T. J. Graves & Co.
Salt Lake City, Utah	Oldsmobile	Randall-Dood Auto Co.
San Francisco, Cal.	Apperson	Myers Motor Car Co.
Sandusky, O.	Oakland	Geo. J. Bing
Seattle, Wash.	Hupmobile	Wm. T. Patten Motor Car Co.
Seattle, Wash.	King	F. H. Bashar
Seattle, Wash.	Oldsmobile	Washington Motor Car Mfg. Co.
Seymour, Ind.	Oakland	Oakland Sales Co.
St. Louis, Mo.	Garford	Gapen Motor Co.
St. Paul, Minn.	Haynes	Brantjen Motor Co.
Taunton, Ill.	Oldsmobile	Carlow Auto Co.
Trenton, N. J.	Haynes	Toman Bros.
Tucson, Ariz.	Chalmers	Huntsman-Hotchkiss Auto Co.
Vancouver, B. C.	Oldsmobile	Begg Bros.
Vincennes, Ind.	Oldsmobile	Johnson Auto Co.
Washington, D. C.	Lozier	Cutting Sales Co.
Washington, D. C.	Oldsmobile	M. T. Pollock
Watertown, N. Y.	Haynes	J. M. Weekes
Williamsport, Pa.	Oakland	W. U. Mussina
Wooster, O.	Oakland	Frank Greenwald
Xenia, O.	Overland	E. W. Smith
York, Pa.	Michigan	R. J. Somerville

COMMERCIAL VEHICLES

Place	Car	Agent
Albany, N. Y.	Stegman	Gould Carriage Co.
Baltimore, Md.	Commerce	The Square Deal Auto Co.
Boston, Mass.	Stegman	Stegman Motor Truck Co.
Chicago, Ill.	Commerce	Commerce Motor Sales Co.
Columbus, O.	Avery	Avery Truck Sales Co.
Columbus, O.	Commerce	Coates Motor Co.
Hudson, N. Y.	Stegman	Ensign & Bates
London, Ontario, Can.	Stegman	Stegman Motor Truck Co.
Los Angeles, Cal.	Commerce	Sparks Miller Motor Co.
Milwaukee, Wis.	Commerce	R. D. Rockstead
Milwaukee, Wis.	Universal	Jesse A. Smith Auto Co.
Minneapolis Minn.	Commerce	F. E. Murphy Auto Co.
Monroe, Mich.	Commerce	Monroe Garage
Nashville, Tenn.	Commerce	W. C. Hirsig Co.
New York, N. Y.	Commerce	Green's Purchasing Agency
New York, N. Y.	Stegman	Merchants Motor Sales Co.
Norfolk, Va.	Sanford	J. R. Callum
San Antonio, Tex.	Commerce	The Hudson Co.
St. Louis, Mo.	Commerce	Merchant's Auto Truck Co.
St. Louis, Mo.	Knox Tractor	Gapen Motor Co.
Tampa, Fla.	Commerce	J. C. Williams

Muir Carbureter Controls Air and Gas Automatically

Cam Connection Between Needle and Air Valve Governs Mixture

THE latest addition to the already large carbureter field is the Muir single jet automatic carbureter shown in the accompanying illustrations. Its chief feature is an automatic interrelation between the opening of the auxiliary air valve and the gasoline jet by which it is claimed the mixture is supplied correctly proportioned at all speeds of the engine.

In the section, Fig. 2, A is the auxiliary air valve, C the cam formed on the end of the horizontally located stem of the air valve and N is the needle. The connection between the needle and the air valve is through the agency of a hardened steel pin P which is permanently attached to the upper barrel portion of the needle and which is kept in constant contact with the cam C by means of the spring S. Any horizontal movement of the air valve stem to the right, which occurs when the air valve opens through the suction of the engine, allows the pin P to travel up the inclined working face of the cam. This action withdraws the needle slightly from the jet, thereby increasing the flow of gasoline to correspond with the larger quantity of air.

Cam Shape Determines Ratio

This relation of air to gasoline by automatic control within the carbureter brings out a new development in carbureter design, though the Muir is not the only carbureter possessing this feature. What is of extreme interest, however, in the design under consideration is that the cam and pin connection provides for an absolutely unlimited ratio of gas to air. By this is meant that the ratio can be made to stand at a constant figure throughout the entire range of valve opening or it can be varied to suit the particular requirements of any type of engine.

The whole claim for economical operation rests on the shape of the cam, and it it is interesting to note that the finished working surface of this part is obtained by actual experiment with the engine running on the block.

A special measuring instrument is applied to the carbureter under test by which micrometer readings of the openings of both air valve and gasoline jet are recorded. Several readings are taken at various speeds with the carbureter adjusted by hand to the most economical positions.

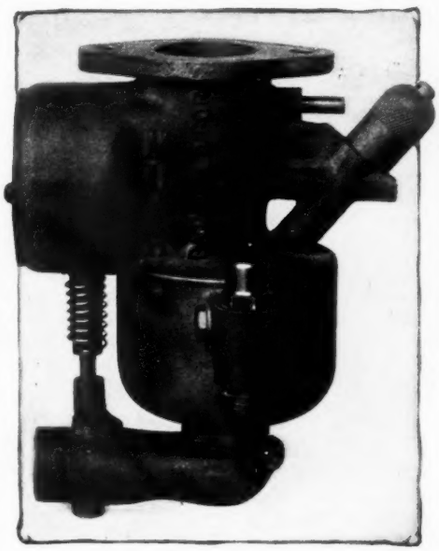


Fig. 1—The Muir automatic carbureter. The diagonal projection at the right contains the removable needle

The results are plotted and the exact shape of the cam necessary to produce automatically the same conditions determined.

Adjustment of the needle is made by turning the screw at the head. This is provided with a spring and ball ratchet which prevents any slackening after adjustment. Each notch in turning represents .001 inch travel of the needle point. A cover K is supplied so that the adjustment can be sealed to prevent tampering. The needle is of hard brass and the tube forming the jet is of the same metal.

The jet J points diagonally into a restricted Venturi passage, in the center of the float chamber. It consists of a plain tube inserted in the throat of the carbureter and is noteworthy in that it is of unusually large diameter. This feature is intended to eliminate clogging trouble through impurities in the gasoline. To withdraw the needle for cleaning or inspection it is only necessary to remove the detachable seat of the air valve A, by unscrewing three screws, when the spring will withdraw the valve stem sufficiently to permit the removal of the needle.

Air Closed for Starting

The main air supply is drawn past the valve A1 which is provided with a crank for connection to the dash control. The upper end of the spindle on which this valve turns carries a cam M which is so arranged that when A1 is closed against the action of the spring on the spindle the cam bears on the inner surface of the valve A, thereby preventing the admission of auxiliary air. This is only used on starting and its purpose is to insure a rich supply of gasoline at the jet.

Mechanically, the Muir carbureter has the merit of being simple in design with few parts. Nickel steel is used for the springs, the valve stem, and the float-needle. This latter operates in a projection of the float chamber which can be turned to any position to suit the gasoline line. The throttle is furnished in the cross position as indicated in the section, or at right angles. The former is advised as the distribution of the mixture to the manifold is more even. The area of the auxiliary valve fully opened is one-third more than the throttle area. The carbureter is light in weight, the 1.5 inch model weighing only 5.25 pounds. The Muir Carbureter Co., Inc., is the maker, and Castle & Monson, 807 Woodward avenue, Detroit, Mich., the factory distributors.

Tendencies in Carbureter Design

Perhaps no important unit of the power plant of the modern gasoline car shows more room for development than the carbureters, and there are not wanting indications that many improvements are about to be introduced in this vital part of the motor's anatomy.

The possibilities of the automatic feature are almost certain to receive increased attention. With the increasing price of fuel, economy becomes the leading consideration. It is not sufficiently realized that economy of fuel is not only a pocket-book advantage. The engine itself is all the better for being supplied with exactly that amount and proportion of mixture which means the minimum of unburnt carbon in the cylinder. Over-carbonization in an engine is often a result of incorrect carburetion when the supposed cause is over-lubrication.

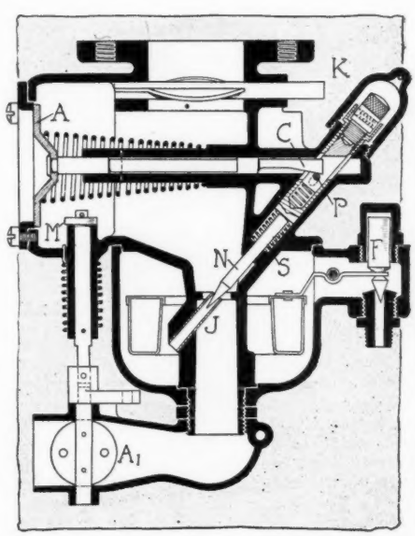


Fig. 2—Showing the cam and pin connection between the air valve A and the gasoline needle N, of the Muir carbureter

Accessories for the Automobilist

MAYO Spark-Plug Pump.—The Mayo Mfg. Co., Chicago, Ill., is turning out a pump which will at once appeal to the motorist who is looking for both convenience and comfort. This is a spark-plug pump which can be instantly applied and which uses only fresh air. Fig. 1, at the right, shows a section. The part M is screwed into the spark-plug seat. On the suction stroke of the engine the metal piston P is drawn downward and at the same time the valve V opens, admitting air into the combustion chamber of the cylinder. On the compression stroke of the engine, the air in the cylinder is forced upward into the chamber R and then through an opening in the center of the piston P through the check valve B to the small chamber H. On the next downward stroke of the motor, the air in the chamber H is compressed and at the same time this compressed air passes the leather-faced piston L. The air is now above the piston L, and on the next upward stroke of the cylinder piston the air is forced through the check valve C and the neck T, which is attached to the tube leading to the tire valve. Thus it is seen that the air is compressed really before it reaches the tire hose. The pump will not work at high motor speeds, and, if the motor is raced, will lock automatically.

Stocker Automatic Tire Pump.—The Manufacturers' Rubber & Supply Co., Detroit, Mich., is producing a hand pump, Fig. 1, at the left, with some new features. The working principle is as follows: The down-stroke closes the valve B and opens A, thus forcing air through C. There is a check valve at C which prevents the return of the air into the pump from the tire. The up-stroke closes the valve A at the top of the barrel and opens B at the bottom, forcing the air through D and thence through C and E into the tire. This gives double action upon one barrel.

Saunders Gasoline Saver.—With the price of gasoline going higher almost every day, the motorist is forced to economize in some manner. The Leslie R. Saunders Co., Los Angeles, Cal., has brought out a gasoline saver that will at once appeal to the owner who is economically inclined. This device, Fig. 2, is a little brass cylinder which screws into the intake pipe of a gasoline engine. On the inner end of this little cylinder is a taper plunger that opens or closes an air passage by the slight movement of a small lever attached to the steering post right at the driver's finger tips. This puts absolute regulation of the fuel mixture right in the driver's hands at all times, and enables him to increase the speed and power of his car from 20 to 50 per cent., according to the maker, by opening the air valve and without using any additional gasoline. The illustration on the left gives a sectional view of the taper valve as applied to the intake pipe, which is shown broken away to illustrate the method of application and the principle of operation. The valve is threaded with a taper pipe thread, .375-inch standard. The air enters the valve through four large holes, the amount being regulated by a taper plunger, which is so shaped as to allow any desired opening and yet make an absolutely air-tight joint when closed. The total movement of the taper plunger from closed to wide open position is only .56 inch, and to effect this movement of the plunger the control lever must move nearly 2 inches, giving a wide range and easy control. The plunger when in open position, owing to its peculiar shape, increases the velocity of the mixture at this point, and the air enters at such an angle as to produce a complete vaporization of the gasoline, and a perfectly homogeneous mixture.

Narco Tire Cut Filler.—The National Rubber Co., St. Louis, Mo., manufactures a very heavy rubber compound for filling cuts and holes in tires. It welds itself to the walls of the cut, becoming an integral part of the tire. It is applied as follows: First, cleanse the cut, dry thoroughly and insert the long tapering nozzle, compress the tube which contains the filler, work in the rubber substance and in a short time the repair is completed. This company also makes other tire preparations such as Tire New, a compound of pure rubber in liquid form. Upon application to the tire, it flows into the small cuts and crevices, and waterproofs the exposed fabric, preventing decay. It also causes the tire to look clean and new and will protect it from injurious atmospheric influences. Another product is non-inflammable rubber cement. This is a highly-perfected rubber cement with strong adhesive qualities. A waterproof top mixture is also manufactured. This is a liquid rubber compound, combined with other ingredients of a highly beneficial nature to anything made of rubber or fabric.

Pedersen Sight Feed Lubricator.—Perfect lubrication is essential to the life and smooth running of any motor. It means longer life, better running, more power and fewer repair bills. The Pedersen Lubricator Co., New York City, is making a lubricator, Fig. 3, which feeds the oil to the motor as the old oil is used up, thus keeping the oil in the crankcase at a constant level. The Pedersen oiling system, specially designed for the Ford car, supplements the present splash system and insures the correct supply of oil for several hundred miles upon each filling of the reservoir. A small rotary pump, easily attached to the end of the timer shaft, draws the oil from a 1-gallon

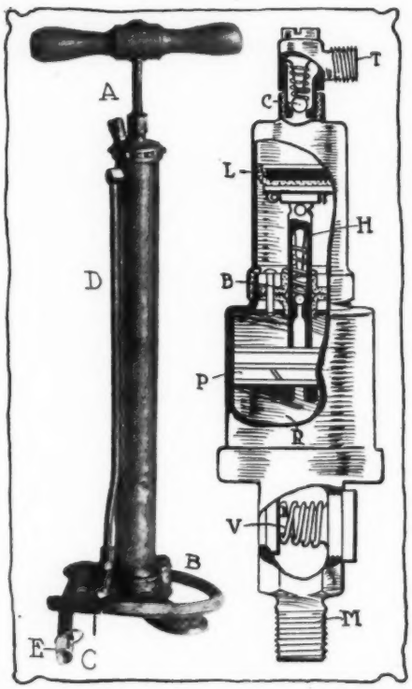


Fig. 1—Left—Stocker pump. Right—Mayo spark-plug pump

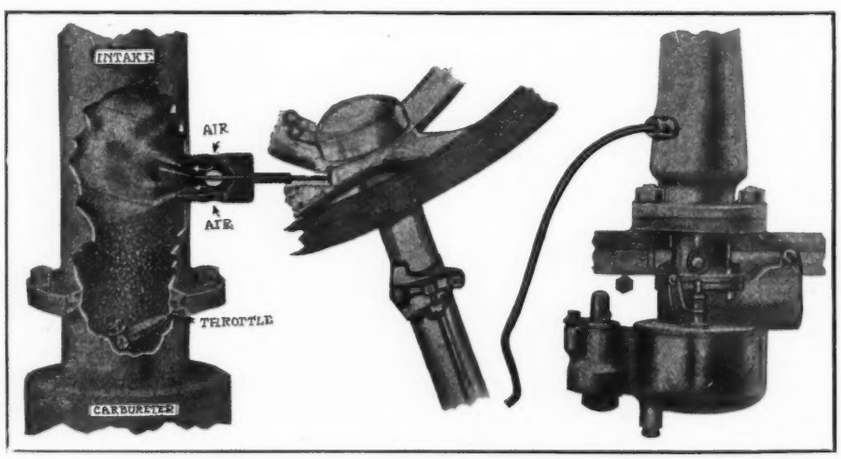


Fig. 2—Saunders gasoline saver: Left—Showing application to intake manifold. Center—Control lever on steering column. Right—Showing exterior connection

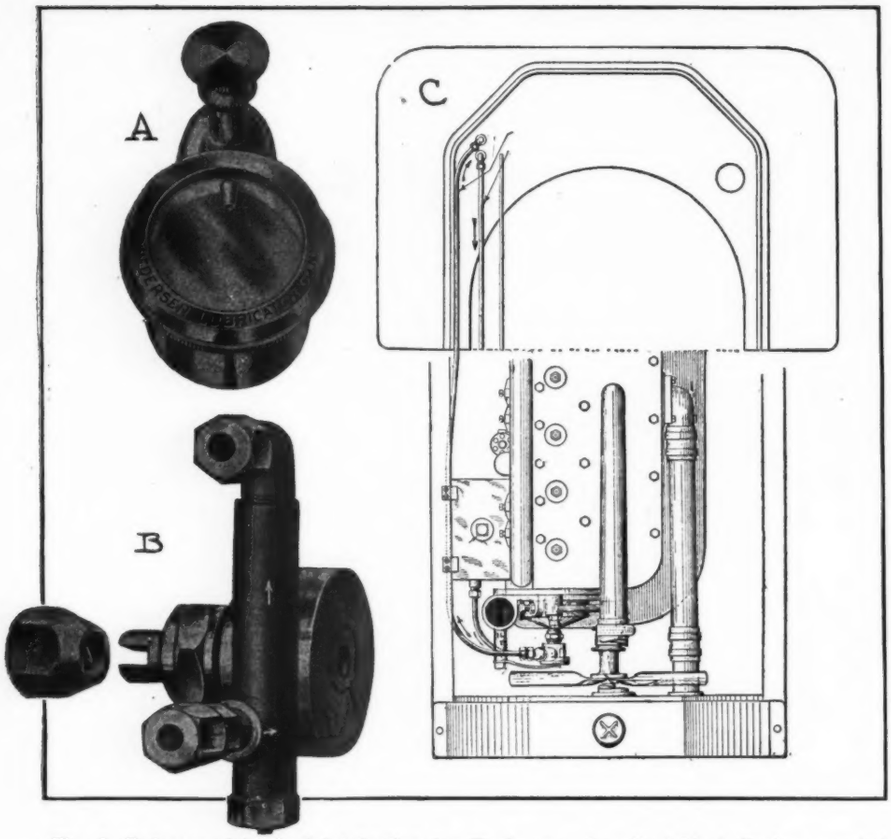


Fig. 3—Pedersen sight feed lubrication for Ford cars. A, adjustable indicator mounted on the dash. B, pump, which is attached to the timer shaft. C, elevation of dash, showing connections of the device, and below plan view of motor with system installed

tank and forces it through the adjustable indicator on the dash A, whence it is fed to the motor, shown in the diagram C, illustrating the application of the system to the car. The sight feed, which is mounted on the dash, is provided with an adjusting screw, whereby the regulation of the proper amount necessary to keep a constant level in the crankcase can be made without leaving the seat. The reservoir, or tank, is placed at the right of the motor, and held in place by means of screws provided. The pump B is easily attached to the timer shaft, after removing the commutator cover and replacing the nut on the timer shaft with the new one furnished with the outfit. After a hole is drilled through the cover, the parts can readily be assembled by replacing the commutator cover with the pump shaft through same. The pump has only two moving parts.

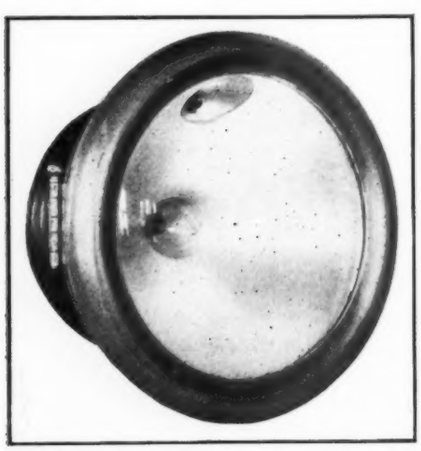


Fig. 4—New Guide special headlight

Guide Motor Lamp.—A new type of automobile headlight, built to conform to the automobile light regulations in Chicago, Ill., and New York City, and to save trouble and expense for car owners, has just been announced by the Guide Motor Lamp Mfg. Co., Cleveland, O. This new light, Fig. 4, called Guide special double bulb De Luxe, promises to excel in popularity the Torpedo headlight, which has been the Guide leader. It is built with a double bulb to meet the requirements for both city and country driving. The large bulb, 16 candlepower recommended, gives a bright, penetrating light, suitable for driving on dangerous country roads. The Guide specially constructed parabolic reflector throws the ray of light a long distance ahead of the machine. Above the center bulb is a smaller bulb of 2 candlepower, with a semi-reflector, which is a part of the big parabolic reflector. This semi-reflector is so built that it throws the light downward in the path of the car, giving plenty of light for city driving. The headlight has double wiring connections. The light does not blind pedestrians. It has a 12-inch front with nickeled rim, black japanned body and a curve or swell plate glass front.

Michener Gasoline Saver—This is a device, Fig. 5, for attachment to the intake manifold between the carbureter and the cylinder by which a regulated supply of extra air can be admitted. By this means, it is claimed, a saving of fuel can be effected. It consists of an air valve with an opening to the air in the form of a priming cup. The valve is provided with a universally-jointed adjusting rod which passes up to the dash or steering column and permits any valve opening from closed to 9/16 of an inch. A number of teeth on a small quadrant at the base of this rod insures the setting of the valve once an adjustment is made.

The device is made in solid brass and has a screwed portion where it is inserted into the manifold. If the manifold, however, is too thin in the wall to take the thread another form of the device in which a U bolt or strap surrounds the pipe affords a secure fastening.

As shown in the illustration, Fig. 5, the air enters the manifold through a fine gauze cone, and it is claimed that the rush of air through this contributes to the breaking up of any suspended globules of gasoline passing into the manifold.

The cup-shaped opening makes a convenient primer, simplifying the process of starting as it is not necessary to open the four priming cups on the cylinders. An incidental purpose served by this device is that when the car is left standing it can act as a lock against theft by simply leaving the valve fully opened. In this position the engine cannot be started.

The maker is E. S. Michener, New Castle, Pa., and the price $5 or $6, according to the method of control.

Automatic Fender and Brake.—W. A. Linquist, Minneapolis, Minn., has invented an automatic fender and brake adaptable to automobiles and motor trucks. When it is struck by an obstruction the fender drops to within an inch of the ground, the brake sets and the ignition circuit is cut, stopping the engine. The fender complies with the Detroit fender ordinance.

National-Standard Jacks—The line of jacks, part of which was described in THE AUTOMOBILE for September 11 under the name of Cook's Standard Tool Co., Kalamazoo, Mich., is now manufactured by the National-Standard Co., Niles, Mich., which has acquired the business.

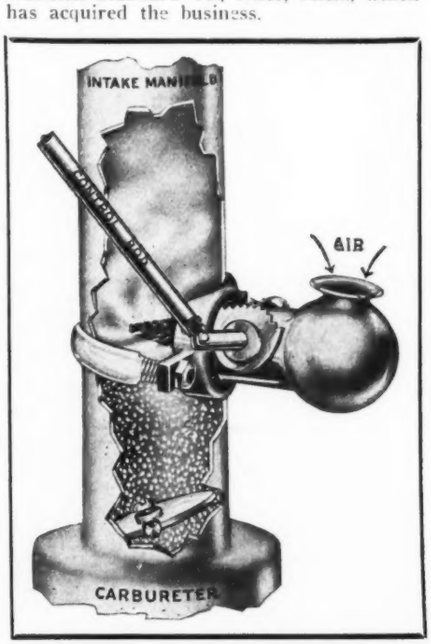


Fig. 5—Sectional view, showing attachment of the Michener gasoline saver to the intake manifold of a motor